Marka-Sweep
Model Video 50

KAY ELECTRIC COMPANY

JAN 7 1963

Marka-Sweep
Model Video 50

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PROCEDURES
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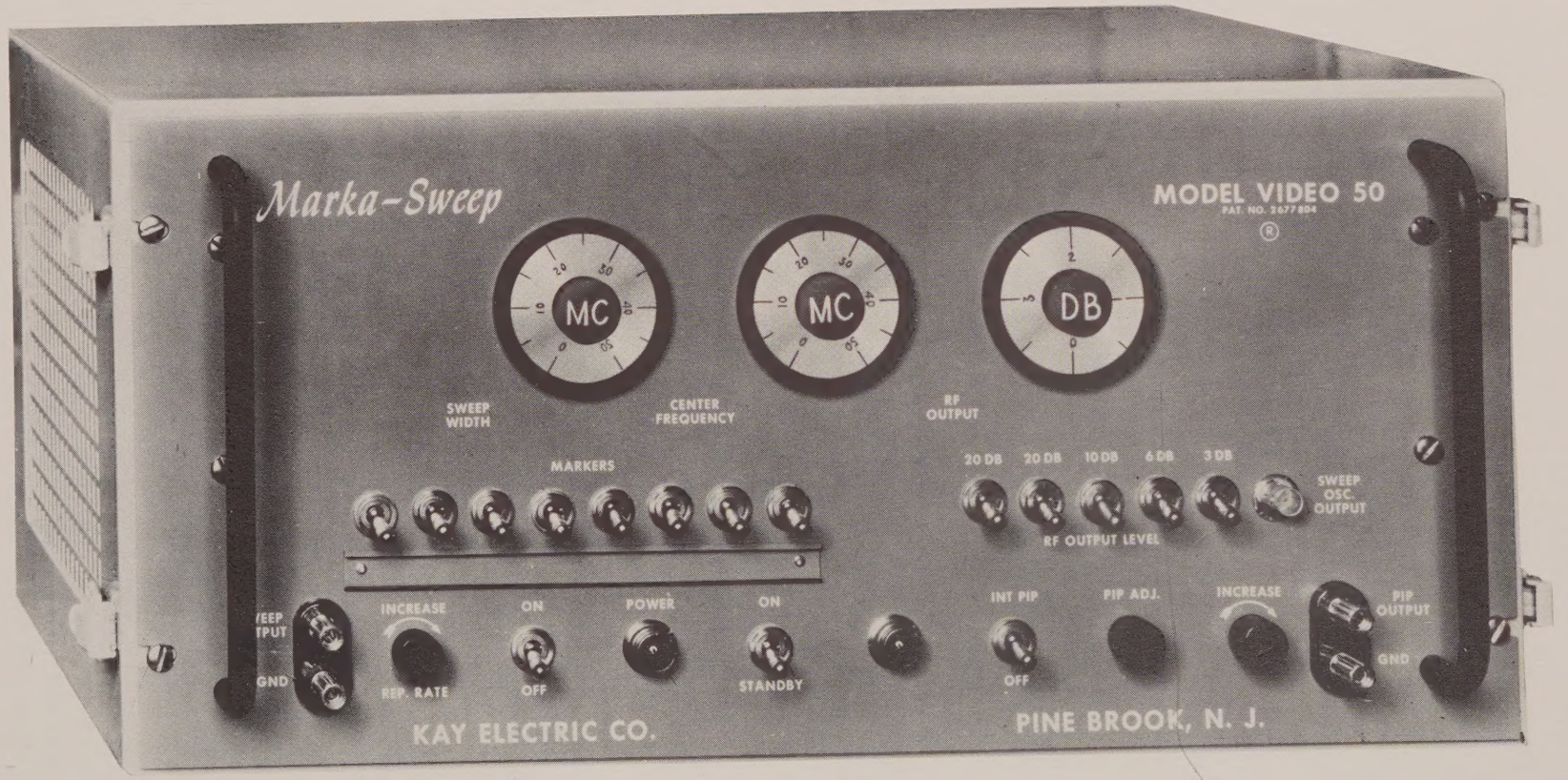


Figure 1, Marka-Sweep Model Video 50

SECTION I
GENERAL DESCRIPTION

A. APPLICATION.

The **MARKA-SWEEP MODEL VIDEO 50** is a wide-band sweeping oscillator for laboratory or production use in testing and aligning video and IF circuits. In conjunction with an oscilloscope, it may be used to obtain a pictorial indication of the frequency response characteristics of amplifiers, filters and similar circuits. Five fixed markers, distributed across the sweeping range, may be used to identify specific frequencies of interest. There are facilities for up to three additional markers if necessary.

B. DESCRIPTION.

The **MODEL VIDEO 50** utilizes variable permeability techniques to generate a linear sweeping RF output whose center frequency may be set to any point between 50 kc and 50 Mc. Sweep width is continuously variable over a range of 3 to 50 Mc. To avoid phasing problems, the sweeping output is synchronized with the 'scope sweep by using a single symmetrical sawtooth voltage both as a horizontal deflection signal for the 'scope and to frequency-modulate the sweeping oscillator. To provide a clear, zero-voltage base line on the 'scope, the sweeping oscillator is disabled on alternate half-cycles of operation. A series of switchable attenuators provide a wide range of RF amplitude control.

The standard **MODEL VIDEO 50** has a complement of five, fixed, crystal-controlled frequency markers. These markers may be used either as positive, pulse-type markers, which are fed directly to the 'scope and are thus independent of the test circuit characteristics, or as "negative" pulse markers which disable the RF circuits and are thus imposed on the sweeping RF signal and fed thru the circuit under test.

The **MODEL VIDEO 50** and its accompanying power supply are enclosed in a single metal cabinet. The entire unit is readily portable.

C. SPECIFICATIONS.

SWEEPING FREQUENCY OUTPUT.

Center Frequency Range: 50 kc to 50 Mc, continuously variable.

Sweep Width: Continuously variable, 3 Mc to 50 Mc.

Sweep Output: Synchronized sawtooth. Amplitude approx. 7 volts peak-to-peak.

Sweep Repetition Rate: Variable around 60 cps; locks to line frequency.

RF Output: 1 volt peak-to-peak across nominal 70 ohms.

Amplitude Linearity: Within 10% over entire sweep range; within 0.05 db/Mc.

Attenuators: Individually switched 20, 20, 10, 6 and 3 db steps. All additive.

Zero Reference: A zero voltage reference line is produced on the oscilloscope during display retrace time.

MARKERS. Five crystal-positioned markers, standard at 10 Mc, 20 Mc, 30 Mc, 40 Mc and 50 Mc. Available alternately as positive pulse-type markers at separate output jack or as negative markers imposed on the sweeping RF output.

Marker Amplitude: Continuously variable from zero to approximately 5 volts peak.

Sawtooth Output: Available as horizontal deflection voltage for 'scope. Amplitude approximately 7 volts peak. Synchronized with sweeping RF output.

TUBE COMPLEMENT:

1 - 5963	2 - 6AU6
1 - 6J6	2 - 6BK7-A
1 - 6V6	1 - 0A2
2 - 5718	2 - 12AU7
1 - 6CL6	1 - 12AT7

1 - E180F

POWER REQUIREMENTS: 220 watts, 117-V (±10%), 50-60 cps a-c. B+ 250 volts electronically regulated.

DIMENSIONS: 9¾" x 19½" x 13".

WEIGHT: 45 lbs.

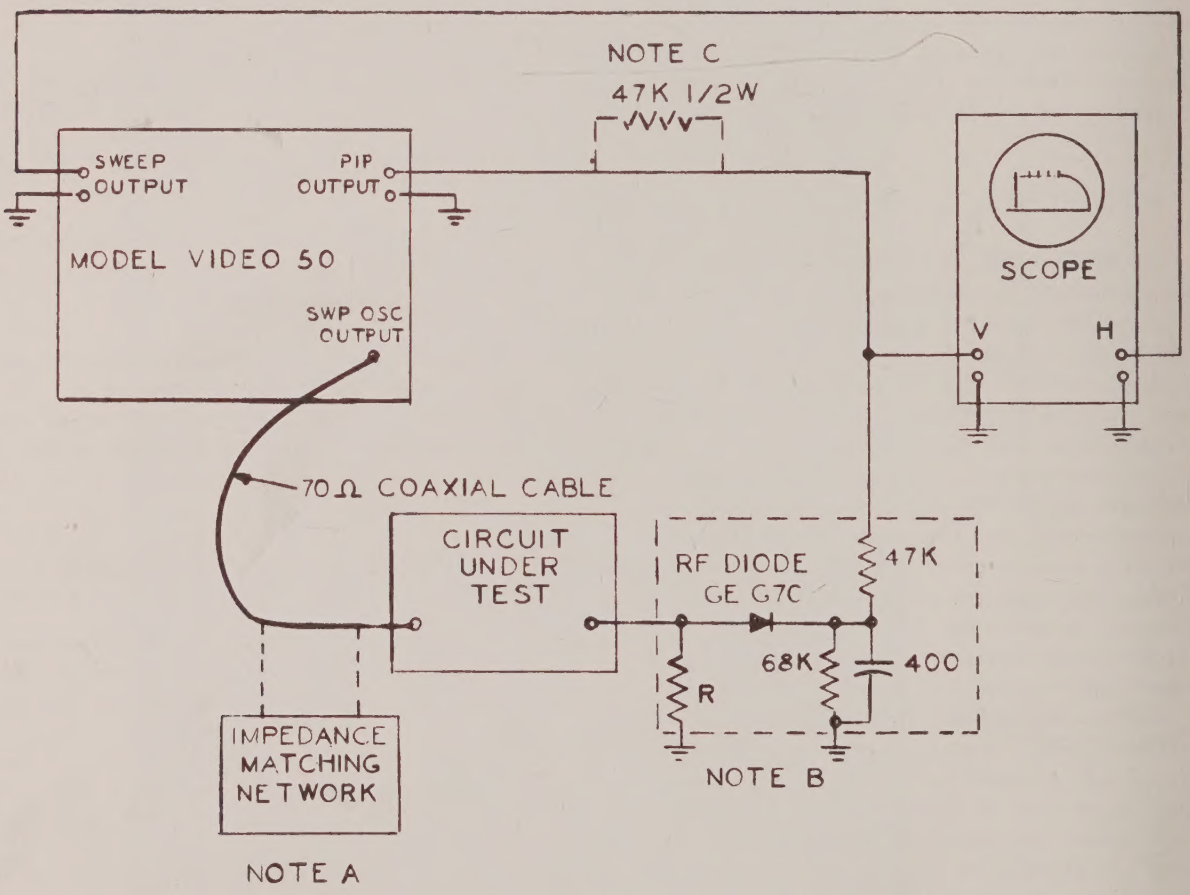
D. EQUIPMENT SUPPLIED.

1. **MARKA-SWEEP MODEL VIDEO 50,** including tubes and crystals.
2. Power Supply.
3. Instruction Manual.
4. Output Cable.

RF CABLE NOT SUPPLIED
AFTER MARCH 1, 1960

E. ADDITIONAL EQUIPMENT REQUIRED.

1. Oscilloscope.
2. Interconnecting Cables.
3. If non-standard markers are required, additional crystals.



NOTES:

A. IF INPUT IMPEDANCE OF CIRCUIT UNDER TEST IS NOT 70 OHMS, USE IMPEDANCE MATCHING NETWORK IN INPUT.

B. VALUE OF R (IN DETECTOR) IS DETERMINED BY LOAD REQUIREMENT OF TESTED CIRCUIT.

C. IF ADDITION OF PIP MARKER SIGNALS AFFECTS shape (NOT AMPLITUDE) OF TEST CIRCUIT RESPONSE OF 'SCOPE, INSERT 47K, ½W RESISTOR AT THE OSCILLOSCOPE.

Figure 2, Interconnection Block Diagram, KA-5866-A

SECTION II
INSTALLATION

A. GENERAL.

The **MODEL VIDEO 50** is designed for table-top operation and thus presents no special installation problems. However, for optimum operation, it should not be subjected to excessive moisture, temperature or vibration conditions. The installation should include provisions for connections to an a-c line, to the equipment under test, and to an external oscilloscope.

B. INTERCONNECTION.

1. Connect the power supply plug to a 220W, 117-V (±10%), 50-60 cps a-c power source.

2. The **MODEL VIDEO 50** is designed to work into a nominal 70 ohms. If the input impedance of the circuit under test approximates this value, use a minimum length of coaxial cable to make a direct connection from the attenuator output jack to the input of the circuit under test. If the input impedance of the test circuit differs from a nominal 70 ohms by any significant amount, a matching device should be used between the **MODEL VIDEO 50** and the test circuit.

3. Connect the **SWEEP OUTPUT** terminals to the horizontal (X-axis) input of the 'scope.

4. Connect output of the circuit under test, via a detector, to vertical (Y-axis) input of 'scope.

5. If positive, pulse-type markers, independent of test circuit conditions, are required, connect the **PIP OUTPUT** connector to the vertical (Y-axis) input terminals of the 'scope.

6. If the addition of the marker signals appears to alter the *shape* (it will alter the amplitude) of the oscilloscope pattern, insert a 47K, ½W resistor in the marker lead at the oscilloscope terminals.

C. CRYSTAL FREQUENCIES.

In the standard versions of the **MARKA-SWEEP MODEL VIDEO 50**, crystal-controlled markers are provided at 10 Mc, 20 Mc, 30 Mc, 40 Mc and 50 Mc. These markers may be supplemented, or existing markers replaced, by changing or adding the marker crystals. For markers below 15 Mc, the substitute crystal should be cut exactly to the desired frequency. For markers above 15 Mc, crystal should be cut 25 kc below desired marker frequency.

SECTION III
OPERATION

A. IDENTIFICATION OF CONTROLS.

1. **SWEEP WIDTH Control** *(R-23)*. The setting of this potentiometer determines the width of the sweeping output. Sweep width is continuously variable from 3 to 50 Mc and is maximized when the control is set completely clockwise.

2. **CENTER FREQUENCY Control** *(C-26a & b)*. The setting of this variable capacitor determines the center frequency of the sweeping output. The center frequency decreases as the dial is turned clockwise and may be set to any point in the 50 kc to 50 Mc range. The dial is calibrated in 5 Mc divisions. For sweep widths of 10 Mc and less, the **CENTER FREQUENCY** dial calibration may be used directly. For sweep widths above 10 Mc, the true center frequency becomes progressively lower than that indicated by the dial calibration.

3. **MARKERS.** Each of these toggle switches controls one of the five crystal-positioned markers produced by the **MODEL VIDEO 50.** In standard equipments, these markers are located at 10 Mc, 20 Mc, 30 Mc, 40 Mc and 50 Mc. When any switch is thrown to the upper position, the corresponding marker circuit is energized. According to the position of the **INTernal PIP** switch (paragraph 8 below), a marker at the selected frequency is produced either as a positive pulse at the separate **PIP OUTPUT** connector or as a notch in the RF output.

4. SWEEP OUTPUT Connectors *(J-1)*. These GR panel connectors make available a linear sawtooth voltage as a horizontal deflection voltage for the oscilloscope. This voltage is synchronized with the sweeping output. Although it is normally locked to the line frequency, its rate may be changed by varying the adjacent REPetition RATE control. The amplitude of the sawtooth signal is approximately 7 volts peak.

5. REPetition RATE Control *(R-12)*. This potentiometer controls the sweep rate of both the sweeping RF output and the sawtooth signal appearing at the adjacent SWEEP OUTPUT. Although these signals are normally locked to the nominal 60 cps line frequency, for hum measurements and other special tests their repetition rate may be varied over a range of 50-100 cps by adjusting this control.

6. Power ON-OFF Switch *(S-15)*. This toggle switch controls the application of all a-c power to the equipment. When this switch is in the ON (upper position), the adjacent POWER light comes on, indicating that all filament circuits, the power supply and sweep generator *(V-2)* have been energized.

7. STANDBY Switch *(S-16)*. This toggle switch controls the application of B+ power to all circuitry except the sweep generator *(V-2)* circuitry. When it is in the ON (upper) position, the light immediately to the right comes on, indicating that the equipment is completely energized and ready to operate.

8. INTernal PIP Control *(S-14)*. When this switch is in the upper position, each of the energized fixed markers appears as a notch in the sweeping RF output. Markers of this type are fed through the circuit under test; consequently, it is not necessary to run a separate marker cable to the oscilloscope. When the switch is in the lower position, the markers appear at the PIP OUTPUT connector as positive pulses which are fed directly to the oscilloscope and are thus independent of the test circuit characteristics.

9. PIP ADJust Control *(R-111)*. The correct setting for this potentiometer is a point midway between the setting at which one or more of the normal complement of (energized) markers disappears and the point at which multiple or spurious pips appear.

10. Pip INCREASE Control *(R-126)*. This potentiometer, located in the lower right corner of the front panel, controls the amplitude of the pulse-type markers appearing at the adjacent PIP OUTPUT terminals. Marker amplitude is maximized when this control is set completely clockwise.

11. PIP OUTPUT Terminals *(J-3)*. When the INTernal PIP switch is in the lower (OFF) position, the energized fixed and variable markers appear at these GR terminals. They are normally connected directly to the vertical (Y-axis) input of the 'scope, to provide markers which are independent of the characteristics of the circuit under test.

12. SWEEPing OSCillator OUTPUT Jack *(J-2)*. This BNC-type jack is the output for the sweeping signal. The maximum RF output level is approximately 1 volt peak-to-peak across a nominal 70 ohms.

13. Attenuator Switches 20DB, 20DB, 10DB, 6DB, 3DB. Each of these toggle switches controls one of the five, additive RF attenuators. Any given attenuator is placed in the circuit when the corresponding toggle switch is thrown to the upper position. By utilizing the proper combination of switches, up to 59 db of attenuation may be used.

14. RF OUTPUT Control *(R-85)*. This potentiometer provides a 3 db continuously variable RF amplitude control which may be used to supplement or interpolate between the switchable attenuators. Attenuation is maximized and output level minimized when this control is set completely counterclockwise.

NOTE: THE FOLLOWING INTERNAL CONTROLS ARE FACTORY-ADJUSTED FOR OPTIMUM OPERATION AND NORMALLY SHOULD NOT BE CHANGED UNLESS NECESSITATED BY COMPONENT REPLACEMENT OR SERIOUS MISALIGNMENT.

15. Sync Lock Adjustment *(R-9)*. This internal potentiometer is used in conjunction with the front-panel REPetition RATE control. It is normally set to lock the sync generator *(V-1)* to 60 cps.

16. Pip Adjustment *(R-122)*. This internal potentiometer, located on the right rear portion of the chassis deck, is used to set the voltage level at which the pip multivibrator fires. It should be set well below the point where the multivibrator is free running.

17. **Video Amplifier Coil Adjustments** *(L-8 & L-9)*. These two slug-tuned coils, located in the center of the chassis deck, are adjusted to obtain a flat, 50 Mc wide passband in the video amplifier.

B. OPERATING PROCEDURE.

It is assumed the **MODEL VIDEO 50** has been installed and connected as outlined in Section II, Installation.

1. Throw the a-c power switch, located on the bottom of the front-panel, immediately to the left of the **POWER** indicator light, to the **ON** position. The **POWER** indicator should light immediately.

2. Wait 5 minutes to allow all filaments to heat. Then throw the **STANDBY** switch to the **ON** position. The indicator light immediately to the right of the switch should light.

3. Adjust 'scope controls until usable pattern is obtained on 'scope face.

4. Adjust **REPetition RATE** control to obtain stationary 'scope display.

5. Set **CENTER FREQUENCY** control to desired frequency.

6. Adjust **SWEEP WIDTH** control to get required deviation about center frequency.

7. Insert sufficient attenuation by switching in additive attenuators and adjusting **RF OUTPUT** control to obtain satisfactory amplitude on sweeping signal.

8. If crystal-controlled markers are required, throw the appropriate **MARKERS** switches to the upper position. In the standard **MODEL VIDEO 50**, markers are provided at 10 Mc, 20 Mc, 30 Mc, 40 Mc and 50 Mc.

9. If positive, pulse-type markers, fed from **PIP OUTPUT** jack directly to 'scope, are required, throw **INTernal PIP** switch to lower position. If "negative", keying pulse markers, momentarily disabling the sweeping signal, are required, throw **INTernal PIP** switch to upper position.

10. Rotate **PIP ADJust** control until full, stable complement of (energized) markers appear.

11. If positive, pulse-type markers are being used, adjust pip **INCREASE** control until markers are desired height.

SECTION IV
THEORY OF OPERATION

A. GENERAL.

The operation of the **MARKA-SWEEP MODEL VIDEO 50** can be more readily comprehended by referring to *Figure 3*, the functional block diagram, and *Figure 7*, the complete schematic of the instrument. In addition to a regulated power supply *(Figure 4)*, the basic circuits of the **MODEL VIDEO 50** include:

1. Sawtooth Sweep Circuits.
2. Sweeping and CW Oscillator Circuits and Mixer Circuit.
3. AGC Circuit.
4. Video Amplifier.
5. Marker Circuits.

B. SAWTOOTH SWEEP CIRCUITS.

These circuits generate a regular sawtooth voltage which is normally locked to the 60 cps power line frequency. For hum measurements and other special tests, this rate may be varied over a range of 50-100 cps by adjusting a front-panel potentiometer (REP RATE). The sawtooth signal is used as a horizontal deflection signal for the auxiliary oscilloscope and to drive the sweeping oscillator.

1. **SYNC GENERATOR** *(V-1)*. This stage uses a 5963 dual-triode in a Schmitt trigger circuit to generate a negative synchronizing pulse for the succeeding sweep generator. A small portion of the 60 cps filament voltage is fed

directly to the grid (pin 2) of the tube. The repetition rate of the sync generator is controlled by this signal and the setting of the internal sync lock control.

2. **SWEEP GENERATOR** *(V-2)*. This 6J6 square wave generator is essentially a free-running multivibrator whose repetition rate is determined both by the setting of the **REP RATE** *(R-12)* and the operation of the preceding sync generator. To provide a clear, zero-voltage reference line, the square wave output is fed to the grids of the sweeping oscillator *(V-4 & V-5)* thereby disabling it during the negative negative portion of the square wave generator's output. The square wave is also fed to an integrating network which shapes it to a regular sawtooth. This voltage is then fed to the **SWEEP OUTPUT** terminals, where it is used as a horizontal deflection signal for the oscilloscope, also to the sawtooth amplifier *(V-3)*.

C. SWEEPING & CW OSCILLATOR CIRCUITS & MIXER CIRCUIT.

The sweeping oscillator circuit uses a saturable reactor technique to generate a linear sweeping RF voltage synchronized to the sawtooth **SWEEP OUTPUT** voltage. The circuitry includes a sawtooth amplifier *(V-3)* and a sweeping oscillator *(V-4 & V-5)* whose output is heterodyned with the output of the CW oscillator *(V-6)* to produce the sweeping RF output signal.

1. **SAWTOOTH AMPLIFIER** *(V-3)*. this stage employs a 6V6 pentode to provide linear amplification of the nominal 60 cps sawtooth signal from the shaping network. The B+ is fed to the plate of this tube through the control winding of a saturable reactor. As the plate current of *V-3* varies with the sawtooth voltage on its grid, it causes a corresponding variation in the inductance of the saturable reactor secondary and thus in the output frequency of the sweeping oscillator. The setting of the **SWEEP WIDTH** potentiometer controls the amplitude of the sawtooth voltage applied to the grid of *V-3* and thus the duration (width) of the sweeping output of *V-4 & V-5*.

2. **SWEEPING OSCILLATOR** *(V-4 & V-5)*. These tubes (5718 triodes) are used to generate a VHF sweeping RF signal. They are connected as a push-pull oscillator whose frequency at any given time is determined by the permeability of the saturable reactor secondary and thus by the magnitude of sawtooth amplifier plate current flowing through the primary winding. The sweeping output is coupled from the plate circuit through a pick-off coil *(L-1c)*. The output is then fed into the primary of RF transformer *T-1*, the secondary of which drives the balanced mixer diodes *(CR-3 thru CR-6)*.

3. **CW OSCILLATOR** *(V-6)*. A 6BK7-A dual-triode is used in a push-pull CW VHF oscillator. The oscillator's frequency is determined by the setting of the **CENTER FREQUENCY** control, *C-26a & C-26b*. The output is coupled from the plate circuit by means of a loose pick-off loop and is fed into the primary of *T-2*. The secondary of *T-2* drives the balanced mixer diodes *(CR-3 thru CR-6)*.

4. **BALANCED MIXER.** The balanced mixer is composed of the four RF diodes *(CR-3 thru CR-6)* and the two RF transformers *(T-1 & T-2)*. The mixer eliminates the two input signals and produces two outputs; one the sum frequency and the other the difference frequency of the two input signals. The low pass filter *(C-22, C-23, C-24, C-25 & L-3, L-4 & L-5)* suppresses the sum frequency and passes the difference frequency to the video amplifier.

D. AGC CONTROL CIRCUITS.

These circuits sample the output voltage and apply a varying plate voltage to the CW oscillator to correct any variations in amplitude with frequency as well as increase overall stability.

1. **AGC DETECTOR.** These are two high frequency diodes used in a conventional voltage doubler arrangement; their output is fed to the first AGC amplifier, *V-9*.

2. **FIRST AGC AMPLIFIER** *(V-9)*. The rectified voltage from the AGC diodes is applied to the control grid of the first AGC amplifier. Any change in either the **INCREASE** pot setting or the RF output of the unit will cause this stage to draw more or less current and therefore will change its plate voltage, which is directly coupled to the grid of the second AGC amplifier *(V-10)*.

3. **SECOND AGC AMPLIFIER** *(V-10)*. A 6AU6, the second AGC amplifier, further amplifies the

control voltage from the preceeding stage and in the same fashion directly biases the grid of the following stage.

4. **AGC CONTROL STAGE** *(V-11)*. A 6BK7A, AGC control tube, is used as a series regulator stage. The current flow through this tube is controlled by the bias placed on its grids by direct coupling from the preceeding stage. The 430 volt potential on its plates is dropped to 150 volts at its cathode, which becomes the CW oscillator *(V-6)* plate supply.

E. VIDEO AMPLIFIER (V-7 & V-8).

V-7 is a wide-band, compensated video amplifier. It produces a gain of approximately 17 db over the bandwidth 30 kc to 50 Mc and the flatness of its response is adjusted by tuning *L-8* and *L-9*.

The cathode follower *(V-8)* is used as an impedance transformer to couple the output of the video amplifier to the attenuator.

F. MARKER CIRCUITS.

These circuits are used to generate pulse-type crystal-controlled markers which are accurate to ±0.05%. They include a series of tuned absorption type crystal filter circuits (which form the fixed markers), four pulse amplifiers, and a pip generator.

1. **CRYSTAL MARKER CIRCUITS** *(Y-1 thru Y-8)*. These crystals are used in absorption type marker circuits to produce the crystal-controlled markers. As the frequency of the sweeping oscillator passes through a given crystal frequency, that crystal generates a train of damped RF oscillations which are rectified by *CR-8* and applied to the control grid of the first trigger amplifier *(V-13)*.

2. **FIRST TRIGGER AMPLIFIER** *(V-13)*. This stage employes a 12AU7 dual triode to provide amplification for the trigger voltage generated by the crystal markers. The output from the first trigger amplifier *(V-13)* is coupled to the grid of the second trigger amplifier *(V-14)* through capacitors and a **PIP ADJust** potentiometer. This control *(R-111)* enables the operator to select pulses of sufficient amplitude to trigger the pip generator *(V-15)* without causing spurious pips.

3. **SECOND TRIGGER AMPLIFIER** *(V-14)*. This stage employs a 12AU7 which provides an additional two stages of amplification for the marker trigger pulses before feeding them to the pip generator multivibrator *(V-15)*.

4. **PIP GENERATOR** *(V-15)*. This stage is a one shot multivibrator employing a 12AT7 dual triode. Negative trigger pulses from the second trigger amplifier are supplied to the grid of one half of *V-15* (through C-60) and to the plate of the other half. Each trigger pulse causes the multivibrator to produce one positive marker pulse. This pulse is fed to the **INCREASE** pip level control, then to the **PIP OUTPUT** terminal *(J-3)*.

Switch *S-14* couples the pip multivibrator to the grid of the video amplifier *(V-7)*. When *S-14* is thrown to the **INT PIP** position, each time the pip multivibrator is triggered a negative pulse is applied to *V-7*, momentarily blanking it. The momentary blanking of *V-7* puts a notch in the RF output at the appropriate crystal frequency.

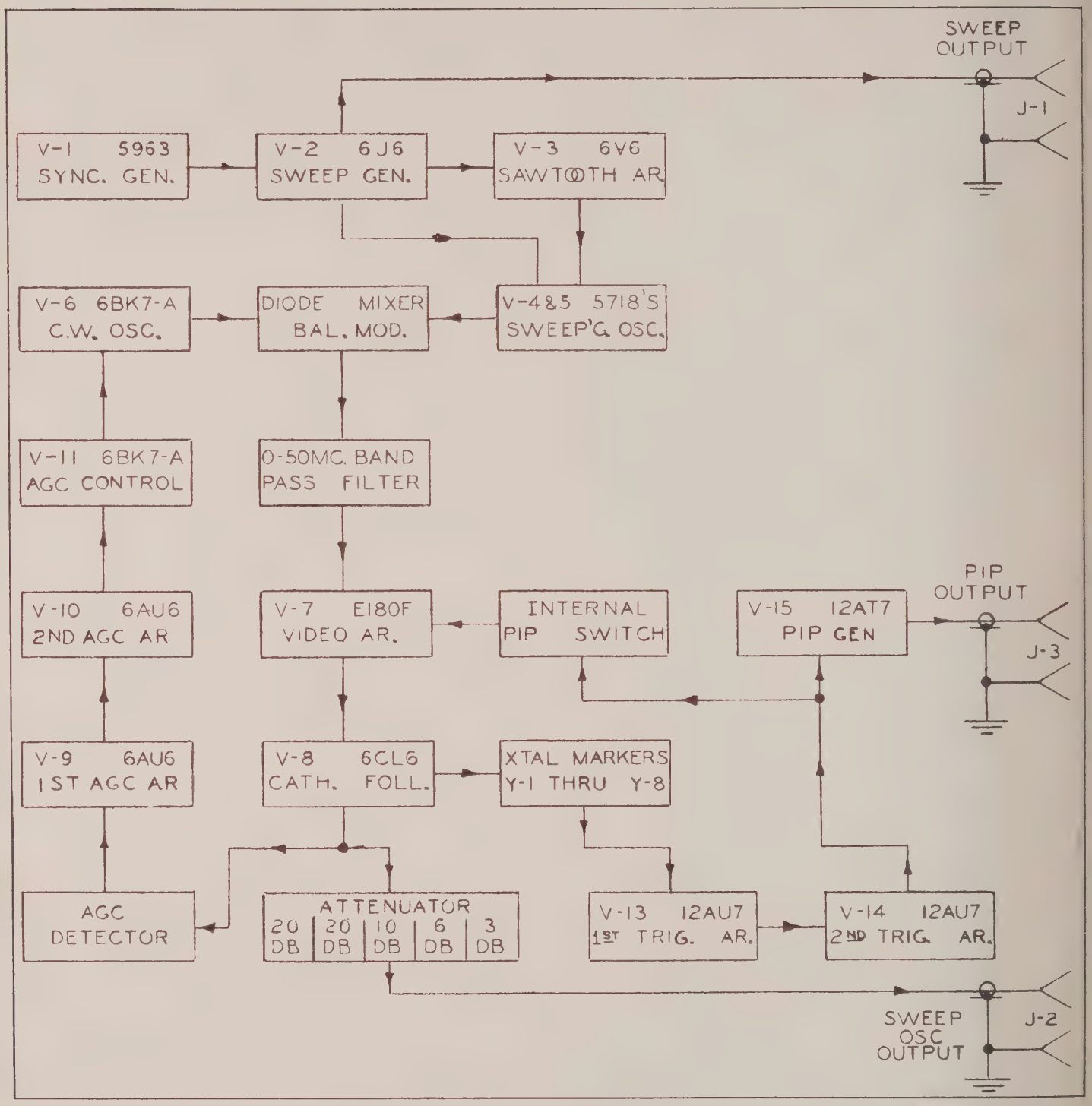


Figure 3, Functional Block Diagram - KA-5245

SECTION V
MAINTENANCE

A. TROUBLE LOCATION.

CAUTION: This equipment contains voltages in excess of 500 volts. Use extreme care in performing maintenance on this equipment.

If the operation of the **MARKA-SWEEP MODEL VIDEO 50** appears to be defective in any respect, first ascertain that the cause of improper operation is not in the oscilloscope, the circuit under test, or the interconnecting cables. If a process of elimination indicates that the trouble originates in the **MARKA-SWEEP**, make the following preliminary checks:

1. Check the operation of all **MARKA-SWEEP** circuits to determine the exact nature and extent of the defect.

2. Make a visual check to determine that all filaments are lit and that there are no loose connections or obviously damaged components.

3. Check the voltage level at the a-c line and the B+ output.

The most common troubles encountered with the **MARKA-SWEEP** are weak or defective tubes, crystal diode failures, and occasional misalignments. The trouble location chart below may be used as a guide to isolate the trouble in a particular circuit or stage. *Figure 7* is a complete schematic of the **MARKA-SWEEP MODEL VIDEO 50** frequency generating circuits. A complete schematic of the regulated power supply used with the **MARKA-SWEEP** is shown by *Figure 4*.

Table I, Trouble Location Chart

SYMPTOM	PROBABLE CAUSE AND CORRECTION
No horizontal deflection.	Check sawtooth generating circuits *(V-1 & V-2)*; check power supply.
Pattern unstable; will not lock in.	Check sync generator *(V-1)*; internal sync lock potentiometer *(R-9)* and REP RATE potentiometer *(R-12)* settings.
No RF output.	Check sweeping oscillator *(V-4 & V-5)*; AGC control tube *(V-11)*; CW oscillator *(V-6)*; video amplifier *(V-7)* and output cathode follower *(V-8)*.
Amplitude of the RF output not constant.	Check AGC amplifiers *(V-9 & V-10)*; AGC control tube *(V-11)*; AGC detector diodes *(CR-10 & CR-11)*. Increase coupling to CW oscillator (push pick-off loop closer to plate tank coil).
No marker output.	Check first and second trigger amplifiers *(V-13 & V-14)*; pip generator *(V-15)* and internal pip adjust *(R-122)*.

B. ALIGNMENT AND ADJUSTMENT.

1. PLATE VOLTAGE ADJUSTMENT. The B+ potentiometer *(R-15)*, located on the power supply chassis, should be adjusted to set the B+ to 250 volts d-c.

2. ALIGNMENT OF SAWTOOTH SWEEP CIRCUITS.

a. Connect SWEEP OUTPUT terminals to vertical (Y-axis) of 'scope with calibrated face.

b. Adjust REP RATE control to set sweep rate to general range of 60 cps line frequency.

c. Adjust internal sync lock control, mounted on the rear of the chassis deck, to lock in sweep output to 60 cps line frequency.

d. Signal should have triangular waveshape and at least 7.0 volt peak-to-peak amplitude. Sync should hold over at least 30 degree rotation of REP RATE control.

3. SWEEPING OSCILLATOR & CW OSCILLATOR ALIGNMENT. If the CW *(V-6)* or sweeping *(V-4 & V-5)* oscillator tubes are replaced, the frequency of the oscillators should be checked as follows:

a. Set the SWEEP WIDTH control for 50 Mc sweep width.

b. Connect the SWEEP OUTPUT jacks to the horizontal input of the scope.

c. Connect the junction of *R-18* and *CR-1* to the vertical input of the scope (a clip lead will do).

d. Strongly couple a VHF grid dip oscillator into the sweep oscillator compartment; the grid dip oscillator makes a suck out in the scope presentation as it is tuned over the range of the sweeping oscillator.

e. Using the grid dip oscillator, the sweeping oscillator should now be adjusted to sweep approximately from 200 to 250 Mc. If the sweep oscillator is high in frequency, the turns on the plate tank *(L-1b)* should be squeezed together; if the sweep oscillator frequency is low the turns on *L-1b* should be spread apart until the oscillator sweeps approximately from 200 to 250 Mc.

f. After the sweep oscillator has been aligned, the CW oscillator should be checked. Connect the SWEEPing OSCillator OUTPUT jack to a 70 ohm detector.

g. Connect the detector output to the horizontal (X-axis) of the scope.

h. Reduce the sweep width to a minimum.

i. Tune the CENTER FREQUENCY control to see that the minimum sweep width (about 2.5 Mc) may be varied from 0 center frequency to 50 Mc center frequency. If it does not cover this range, the turns on *L-6b* (CW oscillator plate tank) should be adjusted (by compressing or spreading them) until it does.

4. MARKER ADJUSTMENT.

a. Connect SWEEP OUTPUT terminals to horizontal input (X-axis) of oscilloscope.

b. Connect the SWEEPing OSCillator OUTPUT to the vertical (Y-axis) input of the oscilloscope through a suitable detector (70 ohms). Connect the PIP OUTPUT terminals to the Y-axis input of the oscilloscope.

c. Energize all crystal markers. Make certain one spike appears for each energized marker.

d. Set front panel PIP ADJust to mid-position.

e. Adjust pip multivibrator potentiometer *(R-122)* until multivibrator is free-running (multiple uncontrolled pips appear). Back off this adjustment to a point below the free-running condition but one where a full complement of pips appear. Make a slight re-adjustment of this control to reach a point which affords the greatest amount of variation of the front panel PIP ADJust control between the limits of disappearing pips and spurious pips.

SECTION VI
200-A POWER SUPPLY

A. DESCRIPTION.

Power Supply No. 200-A is a regulated d-c voltage supply with output voltage adjustable between 225 and 275 volts. The unit operates from a 117V, 60 cps power source. Constructed on an individual chassis, the supply is a completely self-contained unit designed for operation in conjunction with a test instrument requiring a highly stable d-c voltage source. The supply is normally enclosed in the same cabinet as the associated RF circuitry.

B. POWER SUPPLY CIRCUIT DETAILS.

This regulated power supply furnishes all filament and d-c power required by the RF circuits of the test equipment.

1. **RECTIFIER CIRCUIT.** High voltage is supplied from the secondary of *T-1* to the conventional full wave rectifier *(V-1)*, a 5U4GB dual diode. The rectified output voltage is filtered by *C-1*, *L-1* and *C-2*, and fed to the voltage regulator circuits.

2. **VOLTAGE REGULATOR CIRCUIT.** The filtered d-c voltage from *V-1* is fed through a regulating circuit comprising *V-2*, *V-3* and *V-4* to the output terminal. *V-2*, *V-3* and *V-4* are effectively connected in parallel and function as a variable series resistance to control the output voltage. The remaining stages in the power supply *(V-5, V-6, V-7 & V-8)* detect and amplify any significant output voltage changes and feed them to the control stage. They function in the following manner:

The 5651 regulator tube *(V-8)* passes variations in the output voltage to the grid of *V-6*. This tube, its cathode potential regulated by *V-7*, then draws a higher plate current, causing a dip in voltage at the plate of *V-6* and grids of *V-5*. This decrease in *V-5* grid voltage lowers its plate current, reducing the voltage developed across *R-11*.

Since *R-11* is also the bias resistor for the control tubes *(V-2, V-3 & V-4)*, their plate to cathode resistance increases, thereby lowering the power supply's output voltage.

For a decrease in output voltage, the controlling action described above is reversed. *R-15* provides an output voltage adjustment for initially setting the d-c output voltage to the required value.

C. MAINTENANCE.

1. **VOLTAGE ADJUSTMENT.** The setting of *R-15* determines the d-c voltage output of the power supply. To adjust *R-15*, connect a d-c voltmeter at the B+ terminals on the associated equipment; with all power on and power supply under full load, set *R-15* to the required voltage input for the associated equipment.

2. **TROUBLE LOCATION.** The following chart should aid in locating troubles in the power supply:

Table II, Trouble Location Chart

SYMPTOM	PROBABLE CAUSE AND CORRECTION
Zero output voltage from power supply; no heaters light.	Check fuse; if blown, check *C-1* and *C-2* for short before replacing. Also check *V-1* for short. Check AC wiring; check *T-1* and *T-2*.
Zero output voltage, all tubes light.	Check *V-1*. Check *C-2*, *C-3*, *C-5a* and *C-5b* for shorts. Check for open HV winding on *T-1*; check associated equipment for B+ short.
Low output voltage; poorly regulated.	Check tubes *V-1*, *V-2*, *V-3*, *V-4*, *V-5*, *V-6*, *V-7* and *V-8*. Check *C-4* and *C-6* for shorts. Check *R-15*, *R-17*.
Voltage output higher than normal. Poor regulation.	Check *V-8*. Open *R-15*. Check tubes *V-5*, *V-6* and *V-7*.
Excessive ripple in DC output.	Check *C-1* and *C-2*. Check for excessive load on supply.

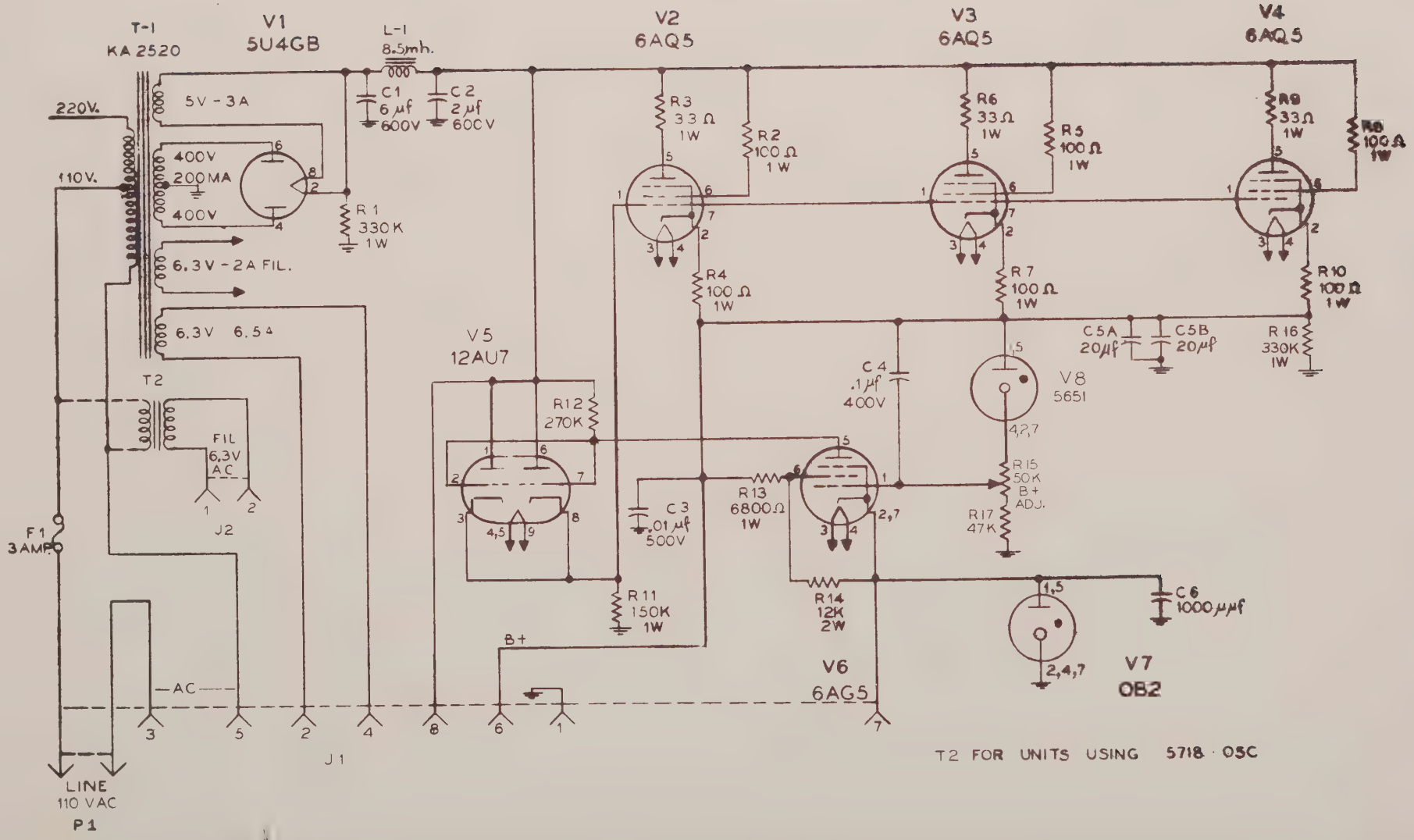


Figure 4, 200-A Power Supply Schematic, KB-2548-N

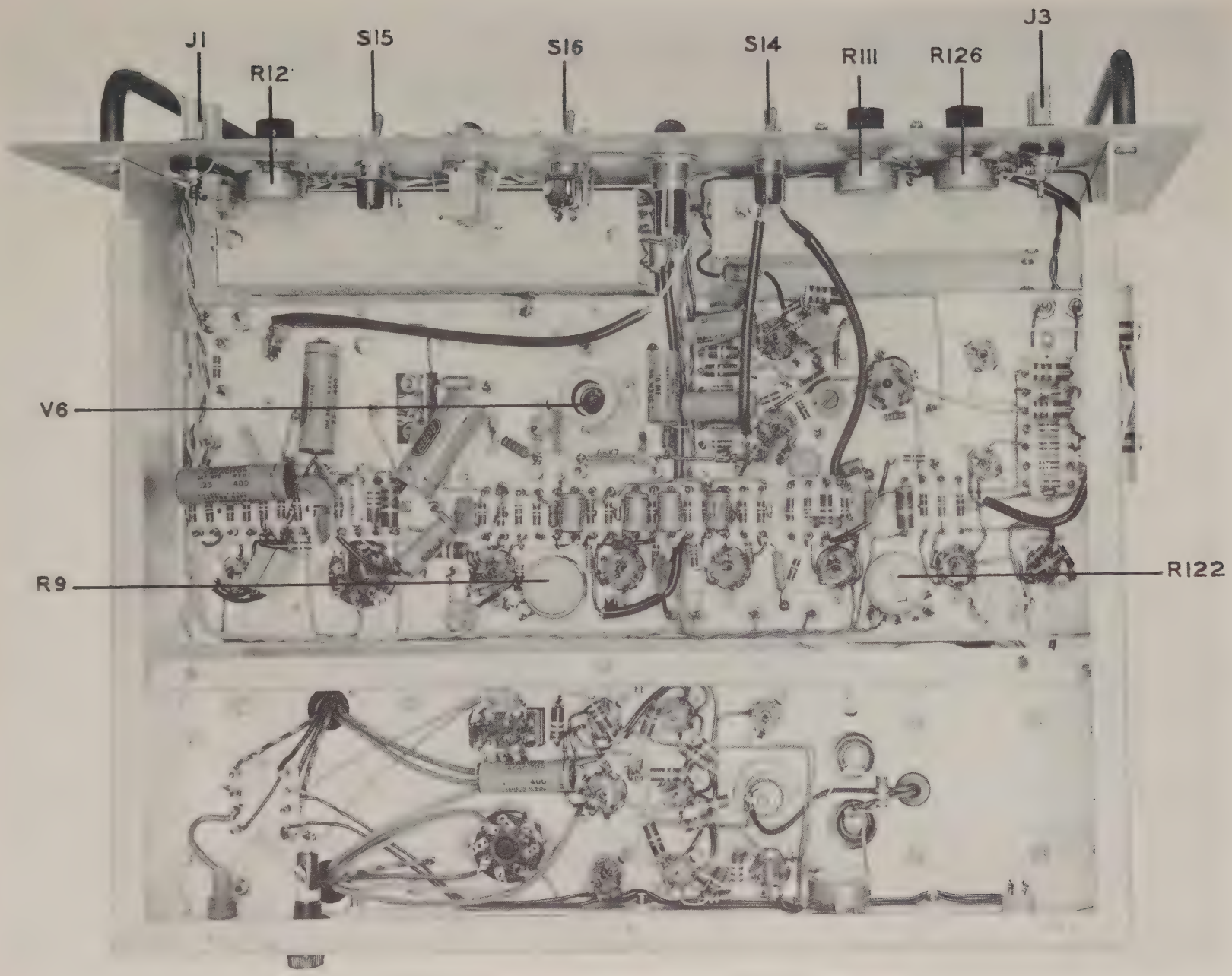


Figure 6, Component Location, Bottom of Chassis

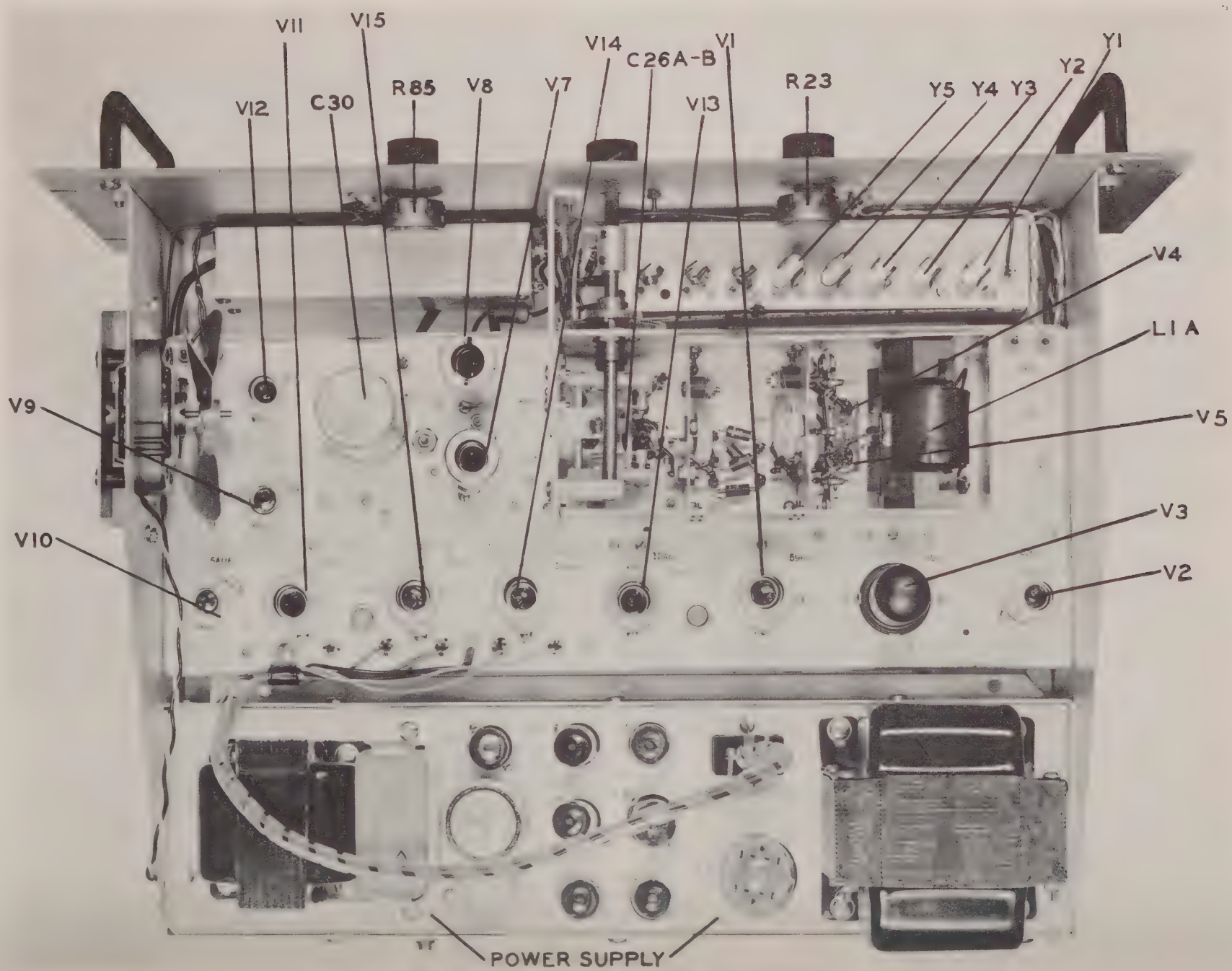


Figure 5, Component Location, Top of Chassis

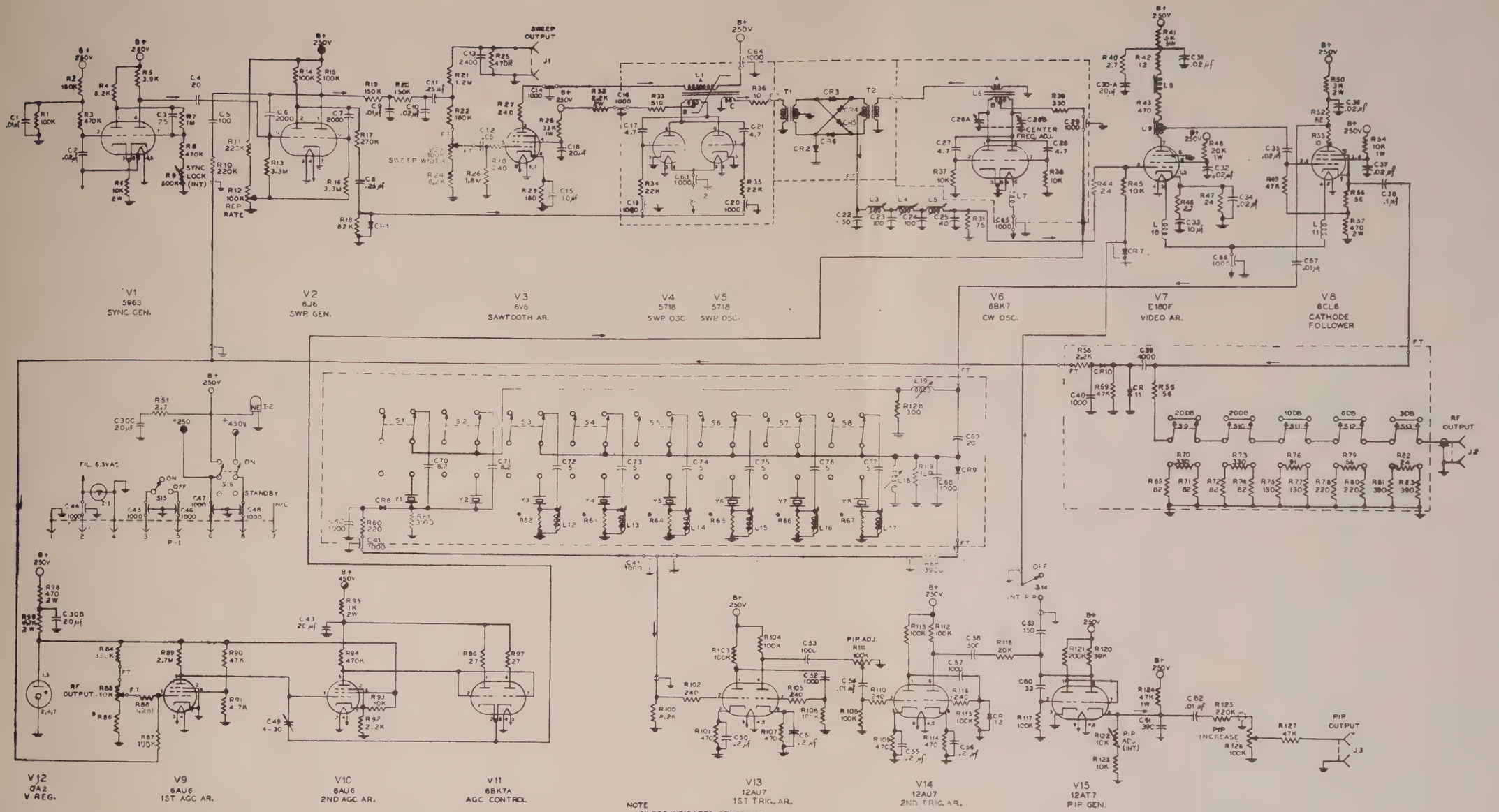


Figure 7, Marka-Sweep Model Video 50 Schematic, KD-5082-B

SECTION VII
PARTS LISTS

A. 200-A POWER SUPPLY. *(KB-2548-N)*

RESISTORS: (UNLESS OTHERWISE SPECIFIED, ALL COMPONENTS ARE FIXED COMPOSITION, 1 WATT, 10% TOLERANCE RESISTORS.)

R-1	330K	R-10	100 OHMS
R-2	100 OHMS	R-11	150K
R-3	33 OHMS	R-12	270K; ½ WATT
R-4	100 OHMS	R-13	3.3K
R-5	100 OHMS	R-14	5.6K; 2 WATT
R-6	33 OHMS	R-15	50K; POT; B^+ ADJ.
R-7	100 OHMS	R-16	330K
R-8	100 OHMS	R-17	47K; ½ WATT
R-9	33 OHMS		

TUBES:

V-1	5U4GB
V-2	6AQ5
V-3	6AQ5
V-4	6AQ5
V-5	12AU7
V-6	6AG5
V-7	0B2
V-8	5651

MISCELLANEOUS:

F-1	FUSE; 3 AMP; 250V
J-1	SOCKET; JONES S-308-AB
J-2	SOCKET; JONES S-302-AB
L-1	CHOKE COIL; KAY #5501; 200 MA; 8.5H; 125 OHMS
P-1	AC LINE PLUG
P-2	SOCKET; JONES S-302-AB
T-1	POWER TRANSFORMER; KAY #2520
T-2	FILAMENT TRANSFORMER; 117V PRI; 6.3V SEC; 2.0 AMP.

CAPACITORS:

C-1	6μF; 600V; PAPER; OIL FILLED
C-2	2μF; PAPER; OIL FILLED; 600V
C-3	0.01μF; 500V; DISC CERAMIC
C-4	0.1μF; 400V; PAPER; TUBULAR
C-5	A & B; 20μF; 450V; F.P. ELECTROLYTIC
C-6	1000μμF; G.P. CERAMIC

B. MARKA-SWEEP MODEL VIDEO 50 *(KD-5082-B)*

RESISTORS: (UNLESS OTHERWISE SPECIFIED, ALL COMPONENTS ARE FIXED COMPOSITION, ½ WATT, 10% TOLERANCE RESISTORS.)

R-1	100K	R-43	470	R-86	FACTORY SELECTED
R-2	180K	R-44	24	R-87	100K
R-3	470K	R-45	10K	R-88	1.2 MEG
R-4	8.2K	R-46	2.7;	R-89	2.7 MEG
R-5	3.9K	R-47	24	R-90	47K
R-6	10K; 2W	R-48	20K; 1W	R-91	4.7K
R-7	1 MEG	R-49	47K	R-92	2.2K
R-8	470K	R-50	3K; 5W; NIT KOOLOHM	R-93	10K; 1W
R-9	500K; POT; SYNC LOCK (INT.)	R-51	2.7	R-94	470K
R-10	220K	R-52	82	R-95	1K; 2W
R-11	220K	R-53	10	R-96	27
R-12	100K; POT; REP RATE	R-54	10K; 1W	R-97	27
R-13	3.3 MEG	R-55	56	R-98	470; 2W
R-14	100K	R-56	56	R-99	4,7K; 2W
R-15	100K	R-57	470; 2W	R-100	8.2K
R-16	3.3 MEG	R-58	2.2K	R-101	470
R-17	270K	R-59	47K	R-102	240
R-18	82K	R-60	220	R-103	100K
R-19	150K	R-61	3.9K	R-104	100K
R-20	150K	R-62	FACTORY SELECTED	R-105	240
R-21	1.2 MEG	R-63	FACTORY SELECTED	R-106	100K
R-22	180K	R-64	FACTORY SELECTED	R-107	470
R-23	100K; POT; SWEEP WIDTH	R-65	FACTORY SELECTED	R-108	100K
R-24	6.2K	R-66	FACTORY SELECTED	R-109	470
R-25	470K	R-67	FACTORY SELECTED	R-110	240
R-26	1.8 MEG	R-68	3.9K	R-111	100K; POT; PIP ADJ
R-27	240	R-69	82	R-112	100K
R-28	33K; 1W	R-70	330	R-113	100K
R-29	180	R-71	82	R-114	470
R-30	240	R-72	82	R-115	100K
R-31	75	R-73	330	R-116	240
R-32	2.2K; 2W	R-74	82	R-117	100K
R-33	510	R-75	130	R-118	20K
R-34	22K	R-76	91	R-119	120
R-35	22K	R-77	130	R-120	39K
R-36	10	R-78	220	R-121	200K
R-37	10K	R-79	56	R-122	10K; POT; PIP ADJ (INT)
R-38	10K	R-80	220	R-123	10K
R-39	330	R-81	390	R-124	47K; 1W
R-40	2.7;	R-82	24	R-125	220K
R-41	5K; 5W; KT. KOOLOHM	R-83	390	R-126	100K; POT; PIP INCREASE
R-42	12	R-84	330K	R-127	47K
		R-85	10K; POT; RF OUTPUT	R-128	300

CAPACITORS: (ALL CAPACITANCES IN μμF, 500 VOLTS UNLESS OTHERWISE SPECIFIED.)

C-1	0.01μF; CERAMIC DISC
C-2	0.02μF; DERAMIC DISC
C-3	25; CERAMIC G.P.
C-4	20; CERAMIC G.P.
C-5	100; MICA
C-6	2000; MICA
C-7	2000; MICA
C-8	0.25μF; 400V; TUBULAR, PAPER
C-9	0.01μF; CERAMIC DISC
C-10	0.02μF; CERAMIC DISC
C-11	0.25μF; 400V; TUBULAR, PAPER
C-12	0.05μF; 400V; TUBULAR, PAPER
C-13	2400; MICA
C-14	1000; CERAMIC FEED THRU
C-15	30μF; 6V; TUBULAR, ELECTROLYTIC
C-16	1000; CERAMIC FEED THRU
C-17	4.7; CERAMIC Q.C.
C-18	20μF; 250V; TUBULAR, ELECTROLYTIC
C-19	1000; CERAMIC FEED THRU
C-20	1000; CERAMIC FEED THRU
C-21	4.7; CERAMIC Q.C.
C-22	50; CERAMIC G.P.
C-23	100; MICA, SILVER 5%
C-24	100; MICA, SILVER 5%
C-25	40; CERAMIC G.P.
C-26	A & B; SPECIAL CENTER FREQUENCY TUNING
C-27	4.7; CERAMIC Q.C.
C-28	4.7; CERAMIC Q.C.
C-29	1000; CERAMIC FEED THRU
C-30	A,B,C. 20μF; 250V; F.P. ELECTROLYTIC
C-31	0.02μF; CERAMIC DISC
C-32	0.02μF; CERAMIC DISC
C-33	10μF; 50V; TUBULAR, ELECTROLYTIC
C-34	0.02μF; CERAMIC DISC
C-35	0.02μF; CERAMIC DISC
C-36	0.02μF; CERAMIC DISC
C-37	0.02μF; CERAMIC DISC
C-38	0.1μF; TUBULAR METALITE
C-39	4000; CERAMIC DISC
C-40	1000; CERAMIC GP
C-41	1000; CERAMIC FEED THRU
C-42	1000; CERAMIC FEED THRU
C-43	20μF; TUBULAR ELECTROLYTIC
C-44	1000; CERAMIC FEED THRU
C-45	1000; CERAMIC FEED THRU
C-46	1000; CERAMIC FEED THRU
C-47	1000; CERAMIC FEED THRU
C-48	1000; CERAMIC FEED THRU
C-49	4/30 TRIMMER CERAMIC S.T.
C-50	0.2μF; 75V; CERAMIC DISC
C-51	0.2μF; 75V; CERAMIC DISC
C-52	1000; CERAMIC G.P.
C-53	1000; CERAMIC G.P.
C-54	0.01μF; CERAMIC DISC
C-55	0.2μF; 75V; CERAMIC DISC
C-56	0.2μF; 75V; CERAMIC DISC
C-57	1000; CERAMIC G.P.
C-58	500; MICA; SILVER
C-59	150; MICA, SILVER
C-60	33, CERAMIC G.P.
C-61	390; MICA, SILVER
C-62	0.01μF; CERAMIC DISC
C-63	1000; CERAMIC FEED THRU
C-64	1000; CERAMIC FEED THRU
C-65	1000; CERAMIC FEED THRU
C-66	1000; CERAMIC STAND OFF SPRAGUE 506C
C-67	0.01μF; CERAMIC DISC
C-68	1000; CERAMIC DISC
C-69	20; CERAMIC G.P.
C-70	8.2; CERAMIC G.P.
C-71	8.2; CERAMIC G.P.
C-72	5; CERAMIC G.P.
C-73	5; CERAMIC G.P.
C-74	5; CERAMIC G.P.
C-75	5; CERAMIC G.P.
C-76	5; CERAMIC G.P.
C-77	5; CERAMIC G.P.

SWITCHES:

S-1 THRU S-8	DPDT CRYSTAL CONTROL MARKERS
S-9 THRU S-13	DPDT ATTENUATORS, FIXED RF OUTPUT LEVEL
S-14	SPST INTERNAL PIP
S-15	SPST POWER AC LINE ON-OFF
S-16	DPDT POWER DC SUPPLY, STANDBY ON-OFF

GERMANIUM CRYSTAL DIODES:

CR-1 & 2	1N294
CR-3,4,5,6	GE, G7C
CR-7,8 & 9	1N294
CR-10 & 11	GE, G7C
CR-12	1N294

COILS:

L-1	REACTOR, SATURABLE
	A. CONTROL WINDING
	B. OSCILLATOR PLATE WINDING CT.
	C. PICK UP WINDING
L-2	CHOKE, HEATER
L-3, 4 & 5	CTC HI PASS FILTER VARIABLE
L-6A	PICK UP WINDING
L-6B	PLATE WINDING C.T.
L-7	CHOKE, HEATER
L-8	COIL, PLATE TUNED, TAP, VARIABLE, VIDEO
L-9	COIL, PLATE TUNED, VARIABLE, VIDEO
L-10 & 11	CHOKE, HEATER
L-12 THRU L-19	SPECIAL, SLUG TUNED

TUBES:

V-1	5963	SYNC GENERATOR
V-2	6J6	SWEEP GENERATOR
V-3	6V6	SAWTOOTH AMPLIFIER
V-4	5718	P.P. SWEEP OSCILLATOR
V-5	5718	P.P. SWEEP OSCILLATOR
V-6	6BK7A	C.W. OSCILLATOR
V-7	E180F	VIDEO AMPLIFIER
V-8	6CL6	CATHODE FOLLOWER
V-9	6AU6	1ST AGC AMPLIFIER
V-10	6AU6	2ND AGC AMPLIFIER
V-11	6BK7A	AGC CONTROL
V-12	0A2	VOLTAGE REGULATOR
V-13	12AU7	1ST MARKER AMPLIFIER
V-14	12AU7	2ND MARKER AMPLIFIER
V-15	12AT7	PIP GENERATOR

MISCELLANEOUS:

I-1	LAMP, MAZDA 44, POWER INDICATOR AC LINE
I-2	LAMP, NEON NE51, POWER INDICATOR DC SUPPLY
J-1	BINDING POST ASSY. GRC 938A&Z; SWEEP OUTPUT
J-2	JACK, BNC, UG-185/AU; SWEEP OSC OUTPUT
J-3	BINDING POST ASSY. GRC 938A&Z; PIP OUTPUT
P-1	PLUG, JONES, P-308-CCT
T-1	TRANSFORMER, MODULATION SWEEP, SPECIAL
T-2	TRANSFORMER, MODULATION, CW, SPECIAL
Y-1 THRU Y-8	CRYSTAL, QUARTZ, MARKERS

MARKA-SWEEP MODEL VIDEO 50 ADDENDUM

August, 1961

MARKA-SWEEP MODEL VIDEO 50 units above serial number 21151 are assembled in accordance with schematic #KD-5082-G. A separate parts listing which indicates component value changes, part number changes, etc., is included in this addendum. Improved reliability has been achieved by changing the physical location of certain components and through the use of newly available, and improved components.

Specific changes to the circuitry include:

a. The addition of a Linearity Adjust control (R-30) and linearity compensation circuit (D-2), and the use of a type 6CL6 tube for V-3 position.

b. A type E280F tube replaces the type E180F tube in V-7 position to provide an increase in output.

c. Circuit and component changes have been made in the marker circuit to provide improved marker stability.

Parts List for Marka-Sweep Model Video 50, Schematic No. KD-5082G:

DWG. SYMBOL NO.	DESCRIPTION	KAY PART NO.
	Capacitors: (ALL CAPACITANCES IN μμF, 500 VOLTS, UNLESS OTHERWISE INDICATED).	
C-1	0.01μF, 400V, MYLAR-PAPER	6899-8
C-2	0.02μF, 400V, MYLAR-PAPER	6899-9
C-3	20, SILVER MICA (DIPPED)	6359-57
C-4	30, SILVER MICA (DIPPED)	6359-58
C-5 & C-6	2000, MICA	6359-34
C-7	0.25μF, 400V, MYLAR-PAPER	6899-3
C-8	0.05μF, 400V, MYLAR-PAPER	6899-6
C-9	0.25μF, 400V, MYLAR-PAPER	6899-3
C-10	100, SILVER MICA (DIPPED)	6359-46
C-11	20μF, 250V, ELECTROLYTIC	6355-3
C-12 & C-13	1000, CERAMIC FEED THRU	6356-4
C-14	5, SILVER MICA (DIPPED)	6359-52
C-15	1000, CERAMIC FEED THRU	6356-3
C-16 & C-17	1000, CERAMIC FEED THRU	6356-4
C-18	5, SILVER MICA (DIPPED)	6359-52
C-19	1000, CERAMIC FEED THRU	6356-3
C-20	FACTORY SELECTED	
C-21	50, SILVER MICA (DIPPED)	6359-50
C-22 & C-23	100, SILVER MICA (DIPPED)	6359-46
C-24	30, SILVER MICA (DIPPED)	6359-58
C-25	1000, CERAMIC FEED THRU	6356-4
C-26 A & B	VU20, VARIABLE (MODIFIED)	5152
C-27	5, SILVER MICA (DIPPED)	6359-52
C-28	0.001, 600V, MYLAR-PAPER	6899-10
C-29	1000, CERAMIC FEED THRU	6356-4
C-30	5, SILVER MICA (DIPPED)	6359-52
C-31	0.02μF, 400V, MYLAR-PAPER	6899-9
C-32	20μF, 250V, ELECTROLYTIC	6355-3
C-33	0.02μF, 400V, MYLAR-PAPER	6899-9
C-34	10μF, 50V, ELECTROLYTIC	6355-1
C-35	1000, BYPASS STANDOFF	6707-5
C-36	NOT USED	
C-37 & C-38	0.02μF, 400V, MYLAR-PAPER	6899-9
C-39	0.1μF, 100V, MYLAR-PAPER	6899-11
C-40	0.02μF, 400V, MYLAR-PAPER	6899-9
C-41	0.01μF, 400V, MYLAR-PAPER	6899-8
C-42	0.001μF, 600V, MYLAR-PAPER	6899-10
C-43	1000, CERAMIC FEED THRU	6356-4
C-44 THRU C-51	2, SILVER MICA (DIPPED)	6359-50
C-52	20, SILVER MICA (DIPPED)	6359-57
C-53	0.001μF, 600V, MYLAR-PAPER	6899-10
C-54 & C-55	0.01μF, 100V, MYLAR-PAPER	6899-12
C-56	4-30, CERAMIC TRIMMER	6358-6

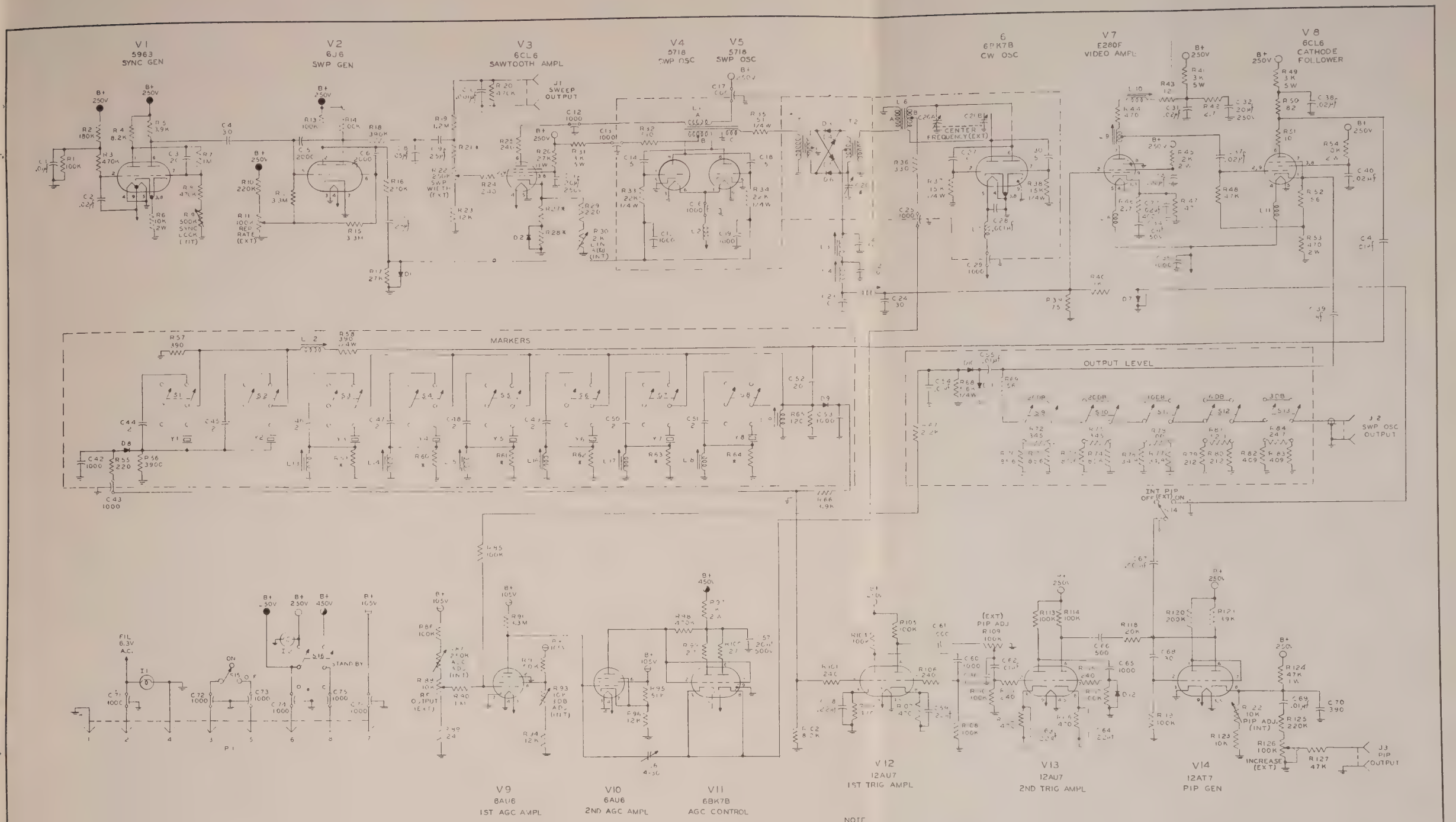
DWG. SYMBOL NO.	DESCRIPTION	KAY PART NO.
C-57	20μF, 500V, ELECTROLYTIC	6355-7
C-58 & C-59	0.22μF, 50V, MYLAR	6411-1
C-60 & C-61	0.001μF, 600V, MYLAR-PAPER	6899-10
C-62	0.01μF, 400V, MYLAR-PAPER	6899-8
C-63 & C-64	0.22μF, 50V, MYLAR	6411-1
C-65	0.001μF, 600V, MYLAR-PAPER	6899-10
C-66	500, 300V, SILVER MICA	6359-66
C-67	390, SILVER MICA (DIPPED)	6359-65
C-68	30, SILVER MICA (DIPPED)	6359-58
C-69	0.01μF, 400V, MYLAR-PAPER	6899-8
C-70	390, SILVER MICA (DIPPED)	6359-65
C-71 THRU C-76	1000, CERAMIC FEED THRU	6356-4
C-77	0.02μF, 400V	6899-9
D-1	1N1692, SILICON RECTIFIER	6357-12
D-2	MEZ5:6 T10 ZENER DIODE	6357-17
D-3 THRU D-6	G7C, SILICON RECTIFIER	6357-4M
D-7 THRU D-9	1N294, GERMANIUM DIODE	6357-18
D-10 & D-11	G7C, SILICON RECTIFIER	6357-4
D-12	1N294, GERMANIUM DIODE	6357-18
I-1	LIGHT INDICATOR, BAYONET #44	249
I-2	LIGHT INDICATOR, BAYONET NE51	1753
J-1	BINDING POST 938	257
J-2	CONNECTOR UG-185-U	204
J-3	BINDING POST 938	257
L-1A	COIL, SATURABLE REACTOR	154
L-1 B & C	COIL, SECONDARY, PICK OFF	L1BC/5082G
L-2	COIL, FILAMENT CHOKE	6394-3
L-3	COIL, SPECIAL SLUG-TUNED	L3/5082G
L-4	COIL, SPECIAL SLUG-TUNED	L4/5082G
L-5	COIL, SPECIAL SLUG-TUNED	L5/5082G
L-6	COIL, SPECIAL	L6/5082G
L-7 & L-8	COIL, FILAMENT CHOKE	6394-3
L-9	COIL, SPECIAL, SLUG-TUNED	L9/5082G
L-10	COIL, SPECIAL, SLUG-TUNED	L10/5082G
L-11	COIL, FILAMENT CHOKE	6394-3
L-12	COIL, SPECIAL, SLUG-TUNED	L12/5082G
L-13	COIL, SPECIAL, SLUG-TUNED	L13/5082G
L-14	COIL, SPECIAL, SLUG-TUNED	L14/5082G
L-15	COIL, SPECIAL, SLUG-TUNED	L15/5082G
L-16	COIL, SPECIAL, SLUG-TUNED	L16/5082G
L-17	COIL, SPECIAL, SLUG-TUNED	L17/5082G
L-18	COIL, SPECIAL, SLUG-TUNED	L18/5082G
L-19	COIL, SPECIAL, SLUG-TUNED	L19/5082G
P-1	PLUG P-308-CCT	453

Resistors: (UNLESS OTHERWISE SPECIFIED, ALL COMPONENTS ARE FIXED COMPOSITION, ½ WATT, 10% TOLERANCE RESISTORS.)

R-1	100 K	1041-E
R-2	180 K	1841-E
R-3	470 K	4741-E
R-4	8.2 K	8221-E
R-5	3.9 K	3921-E
R-6	10 K, 2 WATT	1031-H
R-7	1 MEG	1051-E
R-8	470 K	4741-E
R-9	500 K, 2 WATT, POT, VARIABLE	126
R-10	220 K	2241-E
R-11	100 K, 2 WATT, POT, VARIABLE	121
R-12	3.3 MEG	3351-E
R-13	100 K	1041-E
R-14	100 K	1041-E
R-15	3.3 MEG	3351-E
R-16	270 K	2741-E
R-17	27 K	2731-E
R-18	390 K	3941-E
R-19	1.2 MEG	1251-E
R-20	470 K	4741-E
R-21	FACTORY SELECTED	

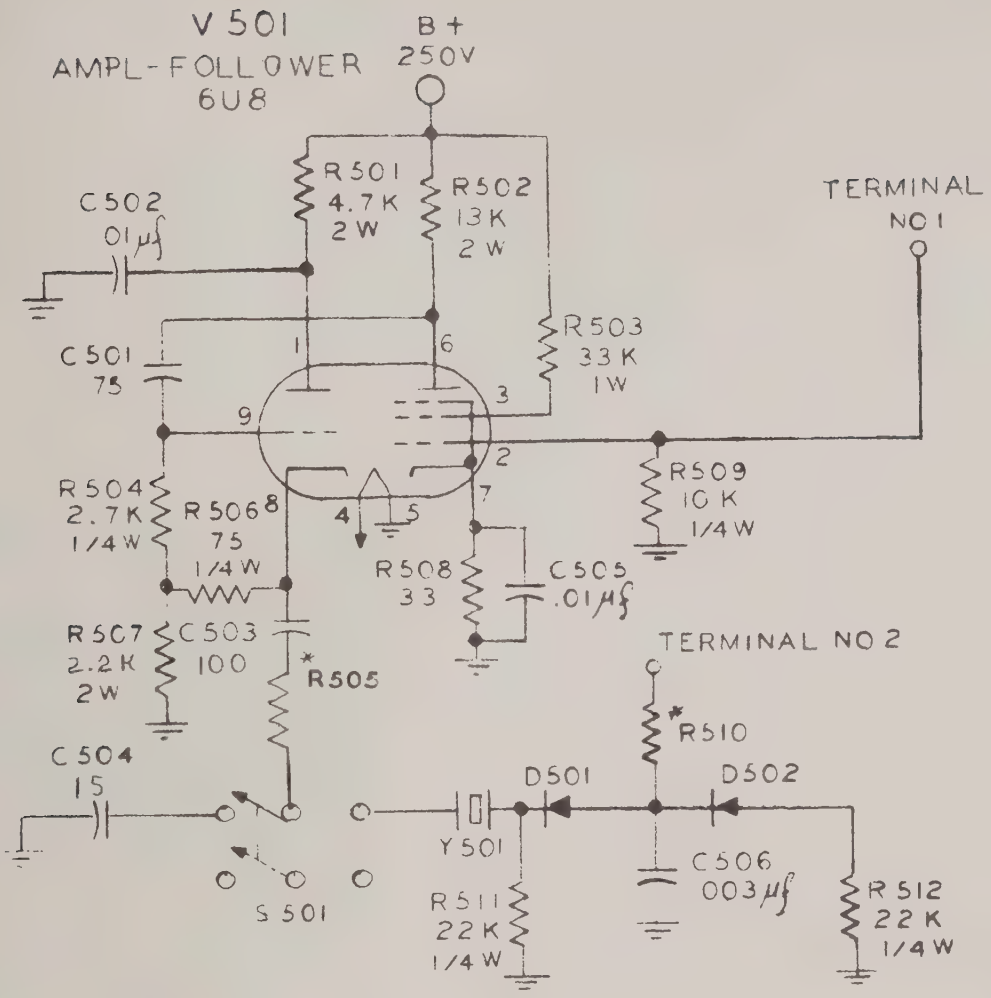
DWG. SYMBOL NO.	DESCRIPTION	KAY PART NO.
R-22	250 K, 2 WATT, POT, VARIABLE	123
R-23	12 K	1231-E
R-24	240, 5% TOLERANCE	2415-E
R-25	240, 5% TOLERANCE	2415-E
R-26	27 K, 1 WATT	2731-G
R-27 & R-28	FACTORY SELECTED	
R-29	220	2211-E
R-30	2 K, 2 WATT, POT, VARIABLE	105
R-31	3 K, 5 WATT	3021-1
R-32	510, 5% TOLERANCE	5115-E
R-33 & R-34	22 K, $\frac{1}{4}$ WATT	2231-C
R-35	51, $\frac{1}{4}$ WATT, 5% TOLERANCE	5105-C
R-36	330	3311-E
R-37	15 K, $\frac{1}{4}$ WATT	1531-C
R-38	15 K, $\frac{1}{4}$ WATT	1531-C
R-39	75	7501-E
R-40	10 K	1031-E
R-41	3 K, 5 WATT	3021-J
R-42	2.7, 5% TOLERANCE	2P75-E
R-43	12	1201-E
R-44	470	4711-E
R-45	12 K, 2 WATT	1231-H
R-46	2.7, 5% TOLERANCE	2P75-E
R-47	47	4701-E
R-48	47 K	4731-E
R-49	3 K, 5 WATT	3021-J
R-50	82	8201-E
R-51	10	1001-E
R-52	56, 5% TOLERANCE	5605-E
R-53	470, 2 WATT	4711-H
R-54	10 K, 2 WATT	1031-H
R-55	220	2211-E
R-56	3.9 K	3921-E
R-57	390	3911-E
R-58	390, $\frac{1}{2}$ WATT	3911-C
R-59 THRU R-64	FACTORY SELECTED	
R-65	120	1211-E
R-66	3.9 K	3921-E
R-67	2.2 K	2221-E
R-68	56 K, $\frac{1}{4}$ WATT	5631-C
R-69	56, 5% TOLERANCE	5605-E
R-70 & R-71	85.6, 1% TOLERANCE	6558-25
R-72	345, 1% TOLERANCE	6558-41
R-73 & R-74	85.6, 1% TOLERANCE	6558-25
R-75	345, 1% TOLERANCE	6558-41
R-76 & R-77	134.8, 1% TOLERANCE	6558-31
R-78	100, 1% TOLERANCE	6558-26
R-79	212, 1% TOLERANCE	6558-35
R-80	212, 1% TOLERANCE	6558-35
R-81	52.1, 1% TOLERANCE	6558-18
R-82	409, 1% TOLERANCE	6558-42
R-83	409, 1% TOLERANCE	6558-42
R-84	24.7, 1% TOLERANCE	6558-13
R-85 & R-86	100 K	1041-E
R-87	250 K, 2 WATT, POT, VARIABLE	123
R-88	10 K, 2 WATT, POT, VARIABLE	108
R-89	24, 5% TOLERANCE	2405-E
R-90	1 MEG	1051-E
R-91	3.3 MEG	3351-E
R-92	150 K	1541-E
R-93	10 K, 2 WATT, POT, VARIABLE	108
R-94	12 K	1231-E
R-95	51 K, 5% TOLERANCE	5135-E
R-96	12 K	1231-E
R-97	1 K, 2 WATT	1021-H
R-98	470 K	4741-E
R-99 & R-100	27	2701-E
R-101	240, 5% TOLERANCE	2415-E
R-102	8.2 K	8221-E
R-103	470	4711-E
R-104 & R-105	100 K	1041-E
R-106	240, 5% TOLERANCE	2415-E
R-107	470	4711-E
R-108	100 K	1041-E
R-109	100 K, 2 WATT, POT, VARIABLE	121
R-110	100 K	1041-E
R-111	240, 5% TOLERANCE	2415-E
R-112	470	4711-E
R-113 & R-114	100 K	1041-E
R-115	240, 5% TOLERANCE	2415-E

DWG. SYMBOL NO.	DESCRIPTION	KAY PART NO.
R-116	470	4711-E
R-117	100 K	1041-E
R-118	20 K, 5% TOLERANCE	2035-E
R-119	100 K	1041-E
R-120	200 K, 5% TOLERANCE	2045-E
R-121	39 K	3931-E
R-122	10 K, 2 WATT, POT, VARIABLE	108
R-123	10 K	1031-E
R-124	47 K, 1 WATT	4731-G
R-125	220 K	2241-E
R-126	100 K, 2 WATT, POT, VARIABLE	121
R-127	47 K	4731-E
S-1 THRU S-8	SWITCH, TOGGLE, DPDT	254-TX
S-9 THRU S-13	SWITCH, TOGGLE, DPDT	254-T
S-14 THRU S-16	SWITCH, TOGGLE, SPST	255-C
T-1	TRANSFORMER, SPECIAL	T1/5082G
T-2	TRANSFORMER, SPECIAL	T2/5082G
V-1	TUBE, 5963	5963
V-2	TUBE, 6J6	6J6
V-3	TUBE, 6CL6	6CL6
V-4 & V-5	TUBE, 5718	5718
V-6	TUBE, 6BK7B	6BK7B
V-7	TUBE, E280F	E280F
V-8	TUBE, 6CL6	6CL6
V-9 & V-10	TUBE, 6AU6	6AU6
V-11	TUBE, 6BK7B	6BK7B
V-12 & V-13	TUBE, 12AU7	12AU7
V-14	TUBE, 12AT7	12AT7
Y-1 THRU Y-8	CRYSTAL, QUARTZ	
	ATTENUATOR (COMPLETE)	4765



NOTE
UNLESS INDICATED OHTERWISE
ALL RESISTANCE ARE IN OHMS
ALL CAPACITANCE ARE IN μμf
X FACTORY SELECTED

Marka-Sweep Model Video 50, Schematic No. KD-5082-G
AUA 21151



NOTE:- THE COMPONENTS AND CIRCUITRY SHOWN FOR THE ONE CRYSTAL MARKER CIRCUIT ILLUSTRATE THE BASIC CONCEPT ONLY. ADDITIONAL MARKER CIRCUITS MAY BE ADDED. COMPONENT VALUES AND CIRCUITRY MAY BE MODIFIED IN ACCORDANCE WITH THE CUSTOMER'S REQUIREMENTS BY THE INSERTION OF INDUCTORS, ADDITIONAL CAPACITORS, RESISTORS, ETC., TO PRODUCE MARKERS AT FREQUENCIES SPECIFIED BY THE CUSTOMER.

* FACTORY SELECTED

TERMINAL #1 CONNECTS TO JUNCTION OF C-41 & C-52.
TERMINAL #2 CONNECTS TO PIN #2 OF V-12.

LOW FREQUENCY PIP CIRCUIT, MARKA-SWEEP MODEL VIDEO 50, KA-6952C.

PARTS LIST FOR THE LOW FREQUENCY PIP CIRCUIT, MARKA-SWEEP MODEL VIDEO 50, KA-6952C.

DWG. SYMBOL NO.	DESCRIPTION	KAY PART NO.
	Capacitors: (ALL CAPACITANCES IN $\mu\mu F$, 500 VOLTS, UNLESS OTHERWISE INDICATED).	
C-501	75, SILVER MICA	6359-61
C-502	0.01μF, 400V, MYLAR-PAPER	6899-8
C-503	100, SILVER MICA	6359-46
C-504	15, SILVER MICA	6359-55
C-505	0.01μF, 100V, MYLAR-PAPER	6899-12
C-506	0.003μF, 600V, MYLAR-PAPER	6899-15
D-501	DIODE, 1N294	6357-18
D-502	DIODE, 1N294	6357-18
	Resistors: (UNLESS OTHERWISE SPECIFIED, ALL COMPONENTS ARE FIXED COMPOSITION, $\frac{1}{4}$ WATT, 10% TOLERANCE RESISTORS.)	
R-501	4.7 K, 2 WATT	4721-H
R-502	13 K, 1 WATT	1331-G
R-503	33 K, 1 WATT	3331-G
R-504	2.7 K	2721-C
R-505	FACTORY SELECTED	
R-506	75	7505-C
R-507	2.2 K, 2 WATT	2221-H
R-508	33, $\frac{1}{2}$ WATT	3301-E
R-509	10 K	1031-C
R-510	FACTORY SELECTED	
R-511	22 K	2231-C
R-512	22 K	2231-C
S-501	SWITCH, TOGGLE, DPDT	254-TX
V-501	TUBE, 6U8	6U8
Y-501	CRYSTAL, QUARTZ (DEPENDING ON CUSTOMER CRYSTAL REQUIREMENTS.)	

SECTION VII
200 ASM POWER SUPPLY

A. DESCRIPTION.

Power Supply No. 200 ASM is a regulated d-c voltage supply with output voltage adjustable between 225 and 275 volts. The unit operates from a 117V, 60 cps power source. Constructed on an individual chassis, the supply is a completely self-contained unit designed for operation in conjunction with a test instrument requiring a highly stable d-c voltage source. The supply is normally enclosed in the same cabinet housing the associated r-f circuitry.

B. POWER SUPPLY CIRCUIT DETAILS.

This regulated power supply furnishes all filament and d-c power required by the r-f circuits of the test equipment.

1. **Rectifier Circuit.** High voltage is supplied from the secondary of *T-1* to the conventional full wave rectifier diodes. The rectified output voltage is filtered by *C-1*, *L-1* and *C-2* and fed to the voltage regulator circuits.

2. **Voltage Regulator Circuit.** The filtered d-c voltage from *D-1* to *D-6* is fed through a regulating circuit comprising *V-1*, *V-2* & *V-3* to the output terminal. *V-1*, *V-2* and *V-3* are effectively connected in parallel and function as a variable series resistance to control the output voltage. The remaining stages in the power supply (*V-4*, *V-5*, *V-6*, *V-7*) detect and amplify any significant output voltage changes and feed them to the control stage. They function in the following manner:

Condenser *C-3* and regulator tube *V-7* transmit variations in the B+ output to the grid of tube *V-5*. This tube, its cathode potential regulated by *V-6*, then draws a greater or lesser plate current, an increase in plate current, causing corresponding plate voltage fluctuations. These fluctuations are transmitted through the cathode follower *V-4* to the grids of the passage tubes *V-1*, *V-2* and *V-3*, where they correct the original variations in the B+ output.

Since *R-12* is also the bias resistor for the control tubes, *V-1*, *V-2* and *V-3*, their plate to cathode resistance decreases, thereby lowering the power supply's output voltage.

For a decrease in output voltage, the controlling action described above is reversed. *R-16* provides an output voltage adjustment for initially setting the d-c output voltage to the required value.

C. MAINTENANCE.

1. **Voltage Adjustment.** The setting of *R-16* determines the d-c voltage output of the power supply. To adjust *R-16*, connect a d-c voltmeter at the B+ terminals on the associated equipment; with all power on and power supply under full load, set *R-16* to the required voltage input for the associated equipment.

2. **Trouble Location.** The following chart should aid in locating troubles in the power supply.

SYMPTOM	PROBABLE CAUSE AND CORRECTION
ZERO OUTPUT VOLTAGE FROM POWER SUPPLY; NO HEATERS LIGHT.	CHECK FUSE; IF BLOWN, CHECK C-1 AND C-2 FOR SHORT BEFORE REPLACING. ALSO CHECK D-1 TO D-6 FOR SHORT. CHECK A-C WIRING; CHECK T-1 AND L-1.
ZERO OUTPUT VOLTAGE, ALL TUBES LIGHT.	CHECK D-1 TO D-6. CHECK C-2, C-5 AND C-4 FOR SHORTS. CHECK FOR OPEN HV WINDING ON T-1; CHECK ASSOCIATED EQUIPMENT FOR B+ SHORT.
LOW OUTPUT VOLTAGE; POORLY REGULATED.	CHECK TUBES V-1, V-2, V-3, V-4, V-5, V-6 AND V-7. CHECK C-3 AND C-6 FOR SHORTS. CHECK R-16 AND R-15.
VOLTAGE OUTPUT HIGHER THAN NORMAL. POOR REGULATION.	CHECK V-7. OPEN R-16. CHECK TUBES V-4, V-5 AND V-6.
EXCESSIVE RIPPLE IN D-C OUTPUT.	CHECK C-1 AND C-2. CHECK FOR EXCESSIVE LOAD ON SUPPLY.

D. 200 ASM POWER SUPPLY PARTS LIST.

CAPACITORS:

C-1	6μF, 600V, OIL-FILLED
C-2	2μF, 600V, OIL-FILLED
C-3	0.1μF, 400V, PAPER
C-4	A & B, DUAL ELECTROLYTIC, 2 x 20μF, 450V
C-5	0.01μF, 500V, CERAMIC DISC
C-6	1000μμF, 500V, CERAMIC

RESISTORS:

R-1	330 K, 1 W	R-9	100, 1 W
R-2	33, 1 W	R-10	100, 1 W
R-3	100, 1 W	R-11	270 K, ½ W
R-4	33, 1 W	R-12	150 K, 1 W
R-5	100, 1 W	R-13	3.3 K, 1 W
R-6	33, 1 W	R-14	5.6 K, 2 W
R-7	100, 1 W	R-15	47K, ½ W
R-8	100, 1 W	R-16	50 K, POT B^+ ADJ.
		R-17	330 K, 1 W

SILICON RECTIFIERS:

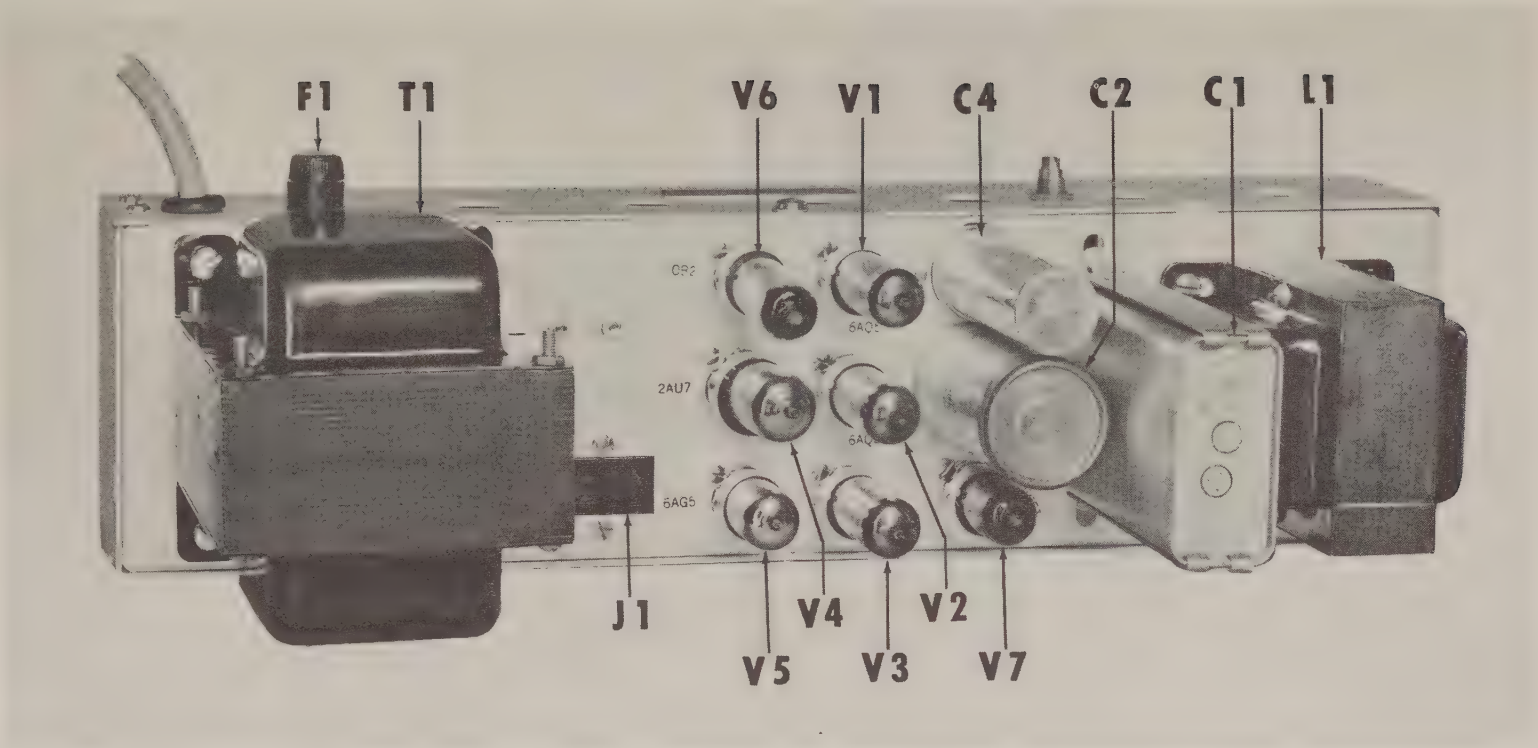
D-1	M-500
D-2	M-500
D-3	M-500
D-4	M-500
D-5	M-500
D-6	M-500

TUBES:

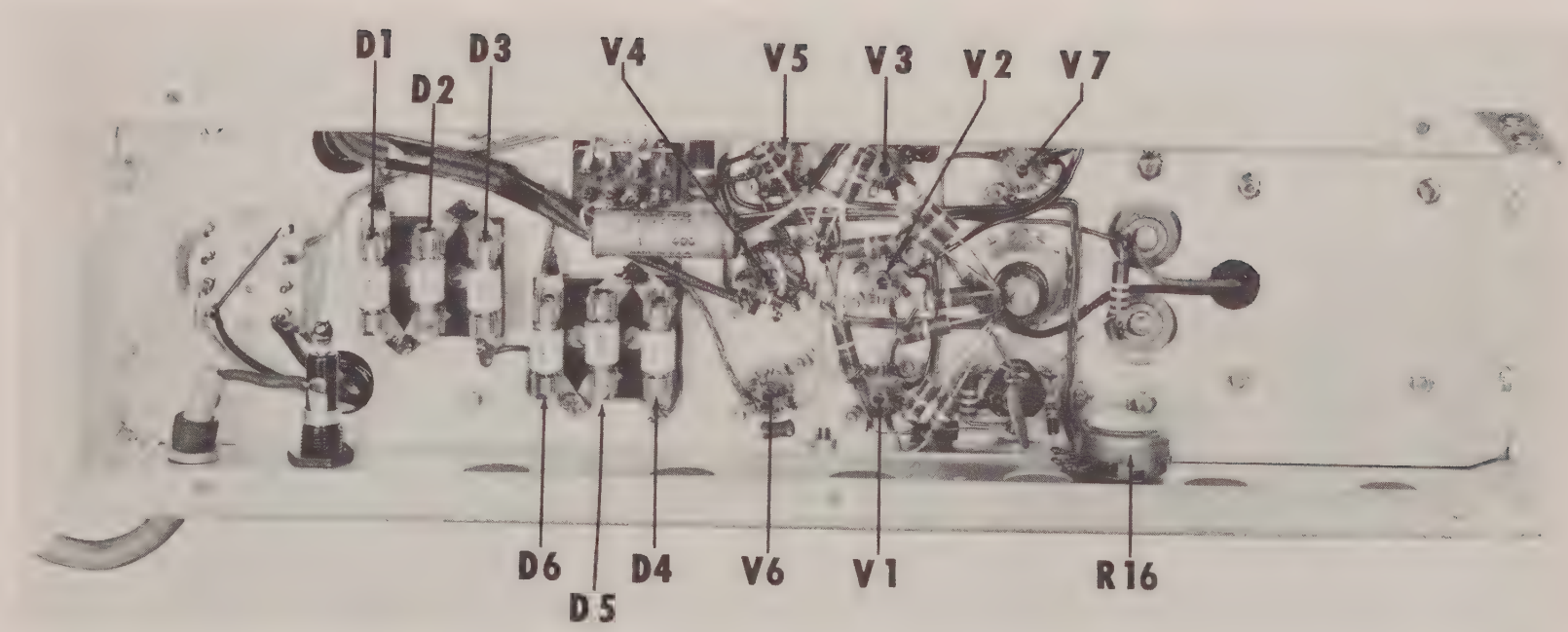
V-1	6AQ5
V-2	6AQ5
V-3	6AQ5
V-4	12AU7
V-5	6AG5
V-6	OB2
V-7	5651

MISCELLANEOUS:

F-1	3A, 250V, FUSE
J-1	JONES S-306-AB
L-1	8 HY, KAY #5501
P-1	AC LINE CORD
T-1	POWER TRANSFORMER, KAY #5361



200 ASM Power Supply Component Location, Top of Chassis



200 ASM Power Supply Component Location, Bottom of Chassis

Voltage & Resistance Readings

VOLTAGE READINGS

NO.	TUBE	PIN #1	PIN #2	PIN #3	PIN #4	PIN #5	PIN #6	PIN #7	PIN #8	PIN #9
V-1	6AQ5	250V	260V	*6.3VAC	*6.3VAC	425V	425V	250V		
V-2	6AQ5	250V	260V	*6.3VAC	*6.3VAC	425V	425V	----		
V-3	6AQ5	250V	260V	*6.3VAC	*6.3VAC	425V	425V	----		
V-4	12AU7	425V	245V	250V	*6.3VAC	*6.3VAC	440V	245V	250V	*6.3VAC
V-5	6AG5	100V	105V	*6.3VAC	*6.3VAC	245V	185V	105V		
V-6	OB2	----	----	----	----	105V	----	----		
V-7	5651	250V	----	----	----	----	----	170V		

VOLTAGE READINGS TAKEN WITH STANDBY (S-15) SWITCH ON.

*VOLTAGE READINGS TAKEN ACROSS FILAMENTS.

RESISTANCE READINGS

V-1	6AG5	150K	450K	----	----	260K	260K	150K		
V-2	6AG5	150K	450K	----	----	260K	260K	----		
V-3	6AG5	150K	450K	----	----	260K	260K	----		
V-4	12AU7	260K	550K	150K	----	----	260K	550K	150K	----
V-5	6AG5	58K	325K	----	----	550K	325K	325K		
V-6	OB2	----	----	----	----	325K	----	----		
V-7	5651	325K	----	----	----	----	----	100K		

RESISTANCE READINGS TAKEN WITH POWER SUPPLY DISCONNECTED FROM UNIT.

Statement above - "Voltage readings taken with Standby (S-15) switch on" - does not apply.

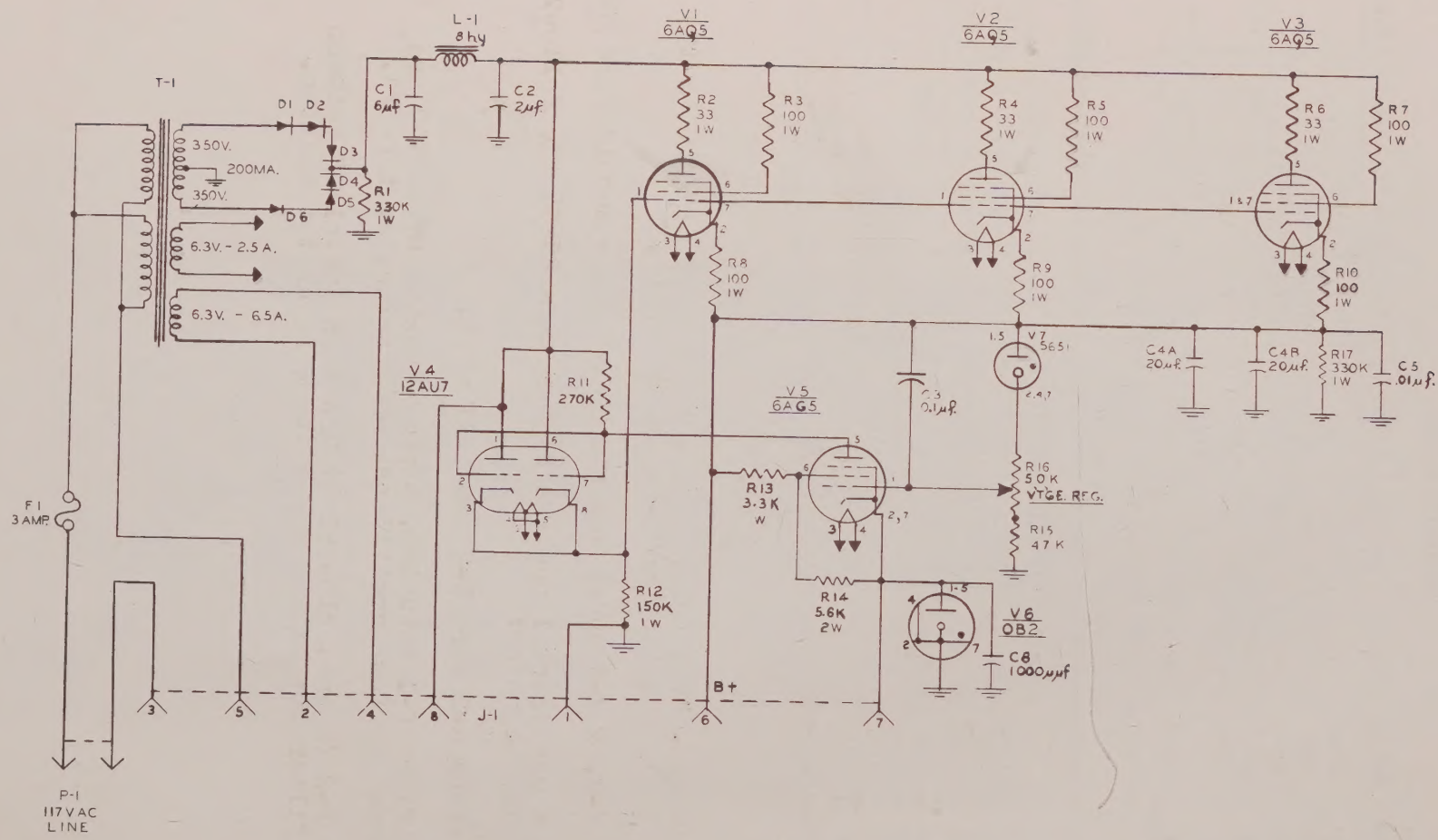
Tubes V-1, V-2, & V-3 under Resistance Readings should read 6AG5

In equipment with serial numbers higher than 20898 the following changes should be noted:

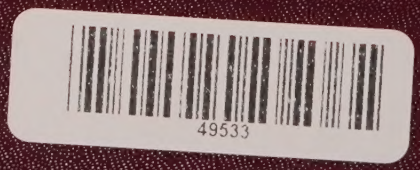
Resistors R-2 thru R-7 are half watt.

Rectifiers D-1 thru D-6, Sarkes-Tarzian type M500 are replaced by four rectifiers, Sarkes-Tarzian type F6.

Fuse F-2 (½ amp. slow blow) has been installed between the filter output and the voltage regulator section.



200 ASM Power Supply Schematic, KB-5456-C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